Developing a model of teachers' web-based information searching: a study of search options and features to support personalised educational resource discovery

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Thesis submitted in fulfilment of the requirements of the degree of Doctor of Philosophy

December 2013

Declaration

I declare that, except where explicit attribution is made, the work presented in this thesis is entirely my own.

Faezeh Seyedarabi, December 2013

Word count: 63687

Abstract

This study has investigated the search options and features teachers use and prefer to have, when personalising their online search for teaching resources. This study focused on making web searching easier for UK teacher practitioners at primary, secondary and post-compulsory levels.

In this study, a triangulated mixed method approach was carried out in a two phase iterative case study involving 75 teacher practitioners working in the UK educational setting. In this case study, a sequential evidence gathering method called 'System Development Life Cycle' (SDLC) was adapted linking findings obtained from the structured questionnaires, observations and semi-structured interviews in order to design, develop and test two versions of an experimental search tool called "PoSTech!".

This research has *contributed to knowledge* by offering a model of teachers' web information needs and search behaviour. In this model twelve search options and features mostly used by teachers when personalising their search for finding online teaching resources via the revised search tool are listed, in order of popularity. A search options is selected by the teacher and features is the characteristic of an option teachers experiences. For example, search options 'Subject', 'Age Group', 'Resource Type', 'Free and/ Paid resources', 'Search results language', and search features that 'Store search options selected by individual teachers and their returned results'.

Teachers' model of web information needs and search behaviour could be used by the Government, teacher trainers and search engine designers to gain an insight into the information needs and search behaviours of teachers when searching for online teaching resources by means of *tackling technical barriers* faced by teachers, when using the internet.

In conclusion, the research work presented in this thesis has provided the initial and important steps towards understanding the web searching information needs and search behaviours of individual teachers, working in the UK educational setting.

Acknowledgement

First and foremost I would like to thank the Almighty God, for giving me the ability, strength and determination to do this project.

Infinite thanks to my dearest father, Ebrahim, for his utmost love and support throughout my PhD. Very big thanks to Dr Arefeh, my darling sister, for her unconditional support and love. Many thanks to my sweetheart, youngest sister, Nayereh, for being there at times when I needed her most and my lovely brother, Mohammad Esmail, for his love and support.

I would like to thank Dr Claudia Lapping and Professor Martin Oliver, my supervisors, for their advice and comments on writing-up my PhD.

I thank Dr Niall Winters (my panel advisor), Professor Richard Noss (upgrade panel member), Dr Will Gibson (upgrade panel member) and Professor Carey Jewitt. (internal reader) for assessing my progress and giving me feedback on my work.

Thanks also go to Dr Donald Peterson, Professor Rose Luckin and Dr Neil Selwyn for their interest in my work and their encouragements.

I would also like to express my sincere appreciation to the teachers who generously gave up their valuable time to participate in this study. Thanks goes to Mr Charlie Owen (who answered my many questions on quantitative methods) and Ms Bet McCallum (who gave me advice on qualitative data analysis).

I would like to acknowledge Institute of Education (London Knowledge Lab) for my PhD funding, during the time I was working on the iClass project.

Seekers of Knowledge

Seekers of knowledge are those who recognise that what is known is very little compared to what is not known, and as a result they consider themselves ignorant, and accordingly they increases their efforts to know more by going out in search of knowledge (Ali Ibn-Abi Talib, Nahjulbalagha)

In the Memory of My Late Beloved Mother

To Hazrat Fatima Zahra (s.a),

the Perfect Lady

Publications related to this PhD

[1] Journal Publications

i. Faezeh Seyedarabi *"Reviewing Web Searching In the 21st Century Education*", I-manager's Journal on School Educational Technology, 7 (4), March – May 2012, 48-60.

ii. Faezeh Seyedarabi "*Reviewing the barriers associated with the technological needs of teachers in the 21st century education*", I-manager's Journal on School Educational Technology, 7 (3), December 2011 – February 2012, 46-55.

iii. Faezeh Seyedarabi "*Personalization: An emerging direction for tackling the web searching barriers faced by teachers when searching for educational resources*", *Webology*, *8* (2), December 2011. Retrieved from http://www.webology.org/2011/v8n2/a90.html

iv. Faezeh Seyedarabi *"The Front-End to Google for Teachers Online Searchin*g", I-manager's Journal of Educational Technology, 3 (1), April-June 2006, page 66-73, ISSN-0973-0559.

v. Faezeh Seyedarabi, Don Peterson and Kevin Keenoy, *"Personalised Search Tool for teachers – PoSTech!"*, I-manager's Journal of Educational Technology, Teacher's Use of Technology For Creative Learning Environment, Vol.1, No.2 pages 38-49, September-November 2005, ISSN – 0973-2217.

vi. Faezeh Seyedarabi and Arefeh Seyedarabi , *"A need for an Adaptive Search Tool for Teachers: case study"*, I-manager's Journal on School Education, Pedagogical Issues, Creative Teaching For The 21st Century Students, 1 (1), July-August 2005, 40-47, ISSN-0973-2217.

[2] Online Journal

i. Faezeh Seyedarabi *"The Missing Link: How search engines can support the informational needs of teachers",* Education and Technology in prospective: eLearn Magazine, 6 April 2006.

[3] Conference Publications

i. Faezeh Seyedarabi , "*PoSTech, Front-End to AltaVista search engine: A case study"*, Paper accepted for the Asian Conference on Education 2009 'Local Problems, Global Solutions?', Osaka, Japan, 24-25 October 2009.

ii. Faezeh Seyedarabi, *"Teaching Teachers to Google: Development of a Personalised Search Tool for Teachers' Online Searching*", Paper accepted for the Society for Information Technology & Teacher Education International Conference, Las Vegas, USA, 3-7 March 2008.

iii. Faezeh Seyedarabi, "*System Development Lifecycle for Building PoSTech: a Personalised Search Tool for Teachers' online searching"*, Paper accepted for the E-Learn 2007-World Conference on E-Learning in Corporate, Government, Healthcare, and Higher Education, Quebec, Canada, 15-19 October 2007.

iv. Rachada Monthienvichienchai and Faezeh Seyadarabi, *"What does "personalisation" really mean for eLearning?"* CAL'05 Virtual Learning?, university of Bristol, UK, 4th-6th April 2005.

v. Faezeh Seyedarabi and Rachada Monthienvichienchai, *"Discrepancies between theory and practice in using learning style in primary education: a case study"*, ED-MEDIA World Conference on Educational Multimedia, Hypermedia & Telecommunications, Montreal, Canada, June 27-July 2, 2005.

[4] Poster Conferences

i. Faezeh Seyedarabi, *Teacher's Search Engine*, Poster Conference, Doctoral School, Institute of Education (IoE), 17th December 2004.

ii. Faezeh Seyedarabi, *Help! I am a teacher in need of Adaptive Navigational Support*, Doctoral School Conference, Institute of Education (IoE), 25th June 2004.

iii. Faezeh Seyedarabi, *Tearing & Sharing the Web, "Avoiding the Mosaic Effect in Personalising E-Learning"*, Poster Conference, Doctoral School, Institute of Education (IoE), 12th December 2003.

[5] Reports

i. Faezeh Seyedarabi and Don Peterson, iClass Deliverables, Interim Report, Month 18, D1.2, Research Strand 3 for 01-01-2005 to 30-06-2006.

ii. Faezeh Seyedarabi, iClass Deliverables, Interim Report, Month 24, D1.2, Research Strand 3 for 01-01-2005 to 30-06-2006.

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Chapter 1

Web Searching In the 21st Century Education

In this chapter, the government's initiatives and policies for improving schools in the UK are reviewed in order to highlight teachers' use of the Internet and online resources in their classroom teaching. Hence, teachers are described to be the pivotal point of all the government's educational policies and indeed the key implementers of their system seeing that teachers are the facilitators and mediators between students and the new educational technologies outlined by the government. In this review, it is concluded that further research is required in the area of information needs and search behaviours of teachers.

1.1 Overview

In this chapter, government's initiatives and its policies for improving schools in the UK are highlighted to be the main drive for the Internet use of teachers and online resources in their classroom teaching.

The aim of this review is to outline *Web searching as an important part of education and society* in the 21st century, saying that in reality teachers are expected by the government to use the Internet and online resources in their classroom teaching.

Process of the review

In this review, (1) *the rise of the Internet and the World Wide Web* is discussed in relation to the use of the Internet and online resources; (2) issues relating *to Web searching* is outlined as a key element of teachers' use of the internet and online teaching resources in their classroom; (3), the UK government's initiations and its policies on Information Communication Technology (ICT) and Information Technology (IT) in the education sector are briefly outlined within the context of Internet and education in the 21st century. Finally, (4) it was concluded that further research activities in the area of *teachers' information needs and search behaviours* is required.

1.2 The rise of the internet and the World Wide Web

The 'Web' emerged in March 1989, twenty years after the creation of the Internet, by a team led by Tim Berners-Lee who developed software called the 'World Wide Web'. The key feature of this software was the invention of the Universal Resource Identifier called HTTP address or what is currently referred to as the Universal Resource Locator (URL), designed to locate objects on the Internet using their unique addresses (Kogut 2003, page 20).

The first website placed on the Internet was 'http://info.cern.ch/' and contained information about the World Wide Web project, its features, capabilities, explanations on how to search the Web for information together with advice on how people could design and upload their website using the system. This invention enabled Web users (mainly academics and researchers at that time) to create and publish their work on the Internet as well as being able to share comments and suggestions about each other's publications (CERN 2006).

The success of the World Wide Web as explained by Berners-Lee (2007) is due to its flexibility and openness to all systems and users around the world, which is mostly based on the following three main factors:

> "[…] 1) unlimited links from any part of the Web to any other; 2) open technical standards as the basis for continued growth of innovation applications, and; 3) separation of network layers, enabling independent innovation for network transport, routing and information applications." (Berners-Lee 2007, page 2)

In addition, in Kogut (2003) article about the 'Global Internet Economy', integration of the World Wide Web software together with the creation of Web browsers such as the 'Netscape' were highlighted as the two main influential factors in the rapid growth of the Internet. Furthermore, the 'semantic' Web of the future was predicted by Berners-Lee (2007) as one that will serve its users much better; will allow Internet users to view websites from a number of different entry points and will ultimately become part of our surroundings:

> "First the Web will get better and better at helping us to manage, integrate and analyze data […] Second the Web will [be] accessible from [a] growing diversity of networks (wireless, wireline, satellite, etc.) and will be available on a ever increasing number of different types of devices. Finally, in a related trend, Web applications will become a more and more ubiquitous throughout our human environment, with walls, automobile dashboards, refrigerator doors all serving as displays giving us a window onto the Web." (Berners-Lee 2007, page 5)

Meanwhile, technology advancements in the Internet and World Wide Web have enabled individuals to talk to each other via video conferencing or teleconferencing tools; to watch news and television programs online; to listen to radios and music; to receive/send mails; to buy goods/services; to book holidays; to register for educational or training courses; to meet new people and make new friends; ask questions from experts via chat rooms, forums or other social groups like the 'Facebook' and 'MySpace'; as well as enabling people to work away from the office environment; meet deadlines by submitting reports or assignments via the Internet and so forth (Slevin 2000, page 38-46; Alexander 2006, n.p). In fact, in the ONS (2011, page 5) Internet access survey, it was reported that:

> "[…] 19 million households in Great Britain had an Internet connection. This represented 77 per cent of households, up from 73 per cent in 2010."

The ONS (2011, page 3) also reported a growth in the use of wireless (wi-fi) hotspots across Great Britain, as described below:

> "In 2011, 4.9 million people, or 13 per cent of Internet users, connected to wireless hotspots provided at restaurants, cafes, hotels, airports etc. The wide availability of these hotspots has encouraged large growth in use over recent years with a seven fold increase since the 2007 estimate of 0.7 million people."

Equally, social networking was identified as the most popular activity especially among the 16 to 24 year olds (ninety one per cent). In general, social networking was more popular among the women Internet users at sixty per cent (ONS 2011, page 3). Other examples (from non-academic sources) of users search patterns include the eMarketer report (market researcher and trend analysis on Internet) on the 'UK Internet users and usage'. In this report it was estimated that almost thirty seven million people went online in an average month that is over sixty per cent of the population (Abrams 2008, n.p). Hence, it was predicted that by the year 2012, Internet use in the UK will reach about seventy per cent of the population:

> "Britain has one of the most experienced and active online populations in the world." (Abrams 2008, n.p)

Technologists like Reisinger (2007, n.p), have also argued that the Internet is becoming one of the most essential components of human survival in the 21st century:

> "The truth of the matter is that we, as a world, have become so reliant on the Internet that it's quickly becoming just as important as water."

Moreover, with the invention of Web 2.0 and government's call for an increased use of online resources and online based tools in classroom teaching, teachers are frequently incorporating digital resources into their lesson plans and have began using ***collaborative tools*** such as 'wikis', 'blogs' and social networks. A clear distinction between Web 1.0 and Web 2.0 was made by Brown (2008, n.p) when he stated that:

> "The original World Wide Web—the "Web 1.0" that emerged in the mid-1990s—vastly expanded access to information. [...] But the Web 2.0 [...] Tools such as blogs, wikis, social networks, tagging systems, mashups, and content-sharing sites are examples of a new user-centric information infrastructure that emphasizes participation (e.g., creating, re-mixing) over presentation, that encourages focused conversation and short briefs (often written in a less technical, public vernacular) rather than traditional publication, and that facilitates innovative explorations, experimentations, and purposeful tinkerings that often form the basis of a situated understanding emerging from action, not passivity."

The main reasons for embracing Web 2.0 in education and indeed classrooms were summarised by Becta (2008) as being (1) pupils' familiarity with Web 2.0

applications; (2) the UK government's educational policy that was aimed at refining collaborative learning in schools and engaging the less enthusiastic student (DfES, 2005); and (3) the relevancy of Web 2.0 to theories of learning, as described below:

> "The most straightforward reason must be recognition that young people are already engaged by Web 2.0 applications. [...] that that there is a match with current overarching policy and curriculum goals [...] that the forms of activity cultivated within Web 2.0 are widely endorsed as important by theoretical perspectives on learning." (Becta 2008, page 28-29)

Teachers are using 'wiki' websites (websites that uses wiki software for users to freely create and edit its Web contents) to initiate project ideas, run brainstorming sessions and teach languages and creative writing. For example, teachers and students are required to learn together since "[…] knowledge is no longer transmitted from one to the other, but each person shares a part of what they know to construct a whole." (Cych 2006, page 35) *Blogs* on the other hand are used by individual teachers (another teaching tool) to further engage students in their learning by having online discussions about a particular topic. Additionally, *Podcasting* technology (broadcasting audio files over the Web) are used by teachers to upload their lectures and course notes online for their students and alert the interested individuals to then using 'RSS' technology, formally known as the 'Really Simple Syndication'. This is said to be a mechanism used for disseminating news and information, and for retrieving personalised content (Cych 2006, page 36).

The Internet is also used by teachers to better prepare and manage their teaching responsibilities and daily tasks. According to the Harnessing Technology Review, ICT usage among teachers at schools and further education colleges in the UK has shown a continues growth (Becta 2007):

> "Schools are beginning to provide remote access to their networks from for staff and pupils. In secondary schools and FE colleges, learning platforms give practitioners and learners access to growing repositories of digital resources, increasing the range and quality of materials available [also] […] Some use of technology to support personalised learning is evident, this is at an early stage." (Becta 2007, page 10)

Nevertheless, despite advancement in Internet technology and development people including teachers are still reported to be using popular search engines like Google for finding relevant online resources:

> "Most of the nearly half a billion users of online social networks [i.e. Facebook and MySpace] continue to use Web 1.0 sites." (Cormode and Krishnamurthy 2008, page 2)

Therefore, this is why the development of search engines is a key element of Internet use in Web 2.0 and beyond. Indeed the advancement of Web technology and the idea that education needs to be personalised according to the learning needs and preferences of individual students highlights the need for research to be undertaken on the potential value of personalised Web searches.

With this background information in mind, the following section of this review will further outline the importance of the World Wide Web together with Web searching in the 21st century.

1.3 Web searching as a key element of internet use

Twenty years ago, when the World Wide Web opened to the public, the Internet contained only one website for users to visit (Bryant, 2012). Nowadays, it is estimated that currently we have 612,843,429 websites on the Internet (Netcraft 2012, n.p). The importance of the Internet and its access to information was also highlighted in the Pew Internet (2010) online survey of eight hundred and ninety five technology stakeholders and critics. As Anderson and Rainie (2010, page 2) reported that:

> "[…] 76% of these experts agreed with the statement, By 2020, people's use of the Internet has enhanced human intelligence; as people are allowed unprecedented access to more information they become smarter and make better choices. Nicholas Carr was wrong: Google does not make us stupid."

Moreover, in a recent Oxford Internet Survey (Dutton and Blank 2011, page 22), the Internet was reported to be the first port of call when people look for information:

> "In 2011, they [people] used the Internet first especially when looking for information on issues for a professional, school or personal project (66%), planning a trip (58%), seeking information about local schools (54%) or about a company (39%)"

Today, Web users can easily add new websites or Web pages to the Internet; create and store their personal images and information online through the availability of various Web tools using hosting packages or free Web spaces online. For example,

when joining websites such as ‘myspace’, ‘blogger.com’ or ‘facebook’, Internet users with little or no programming skills are able to write and publish their Web pages easily. In fact, this development was previously highlighted in Strauss (2007) article entitled “The Future of the Web, Intelligent Devices and Education”. In this articleStrauss (2007, page 34) Strauss (2007, page 34) described the Web as an indispensable tool that was used in nearly all aspects of life:

> “In the past the Web was used to display documents and images. Today it is being used for education, research, software distribution, audio and video conferencing, and electronic commerce.”

Tim Berners-Lee (2007) also explained that the Web has improved enormously during the last five years with the invention of new technologies like broadband and the wireless technology. Accordingly, the Web continued to improve as in ONS (2011, page 5) it was reported that:

> “In 2011, 19 million households in Great Britain had an Internet connection. This represented 77 per cent of households, up from 73 per cent in 2010 […] Broadband has now almost entirely replaced dial-up Internet, with 93 per cent of Internet connected households using broadband compared with 84 per cent in 2007. Just 2 per cent of connected households used dial-up, compared with 16 per cent in 2007. The remainder used only a mobile Internet connection”

Finally, the ease of finding online resources together with the increasing production of online contents (Web pages) was also observed in the Oxford Internet Survey (Dutton and Blank, 2011, page 21):

> “Ease of finding information is one of the major reasons to go online, and people tend to turn to the Internet first when they are looking for information […] Creative activities and production of content are generally increasing. This is one effect of the considerable simplification of production made possible by social media.”

Therefore, with the Web ever expanding pages and digital contents, Web searching is indeed considered as a key element of Internet use in the 21st century.

Further to the above mentioned information, the following section of this chapter will provide a brief literature review on the initiations and policies of the UK government in Information Communication Technology (ICT) and Information Technology (IT),

in order to highlight the government's expectations on the Internet and ultimately online resources usage of teachers in their classroom teaching.

1.4 Government's educational policy in the UK and teachers' use of the Internet

In 1998, just one year after New Labour came into power the Green paper entitled "Teachers: meeting the challenge of change" was launched. This Green Paper was described by Tony Blair as (DfEE 1998, page 4),

> "[...] the most fundamental reform of the teaching profession since state education began."

For Tony Blair educational policy had high national priority, since education was believed to be the pivotal point of the economy and public services (Furlong, McNamara et al. 2008). Thus, the educational reform (his 'national campaign') was designed to strengthening the country's economy and public services. This view was highlighted in Furlong (2008, Page 728):

> "National prosperity, social justice and cohesion are all seen to rest on the shoulders of education, on the creation of a highly skilled workforce with the knowledge, enterprise and insights required to attract the global supply of high-skilled, high-waged employment."

The government intended to tackle problems with the teaching profession by injecting more and better trained teachers into the system and above all making teachers accountable for their teaching by detailing what should be taught in classrooms on a day to day practice. Individual teachers and the objective of schools were defined by the government's policy on education and its educational reform. According to Furlong 2009 (page 771), this change:

> "[...] meant a profession that was more diverse in intake, was better paid held in higher esteem, better supported but, most significantly, a profession that was much more tightly managed in relation to national policy objectives than ever before." (Furlong 2009, page 771)

Hence, the government's educational policies was focused on improving primary and secondary schools' literacy and numeracy achievements through Key Stages (KS) 4 and 3 strategies, respectively (DfEE 1997b; Blunkett 2000). Next, the "Every child

matters" agenda came to the force (DfES 2003a) and lastly, the government's educational policy was shifted towards "Personalisation of Learning", (DfES 2006). Indeed, it can be said that educational policies set by the government has made direct influences on the classroom practices of teachers, which often led to having extra work load. This fact was highlighted by (Katrijn, Kelchtermans et al. 2006, page 209) in the following statement:

> "Although [decisions made by policy-makers] mostly justified by intentions of improving educational quality, teachers often experience such measures as a significant extension of their teaching role. Unfortunately, these extensions are, more often than not, distractions from the core activity of teaching."

As a second example, Nixon and his colleagues (2008) investigated the conditions, attitudes and implementation of National Policy teachers in English Further Education (FE) by reviewing reports and studies of UK educational policy at post-compulsory level during 1976 to 2007. In this review, studies that completed in the last ten years were selected for an in-depth analysis using qualitative research methods that is conducting semi-structured interviews with reflective diaries, group working and observations among teachers and managers and managers (Nixon, Gregson et al. 2008).

Results from this study confirmed that teachers have indeed executed government's national policy in their classroom and that teachers were able to manage this task by balancing their teaching responsibilities towards their students (learners) as well as their duties placed on them by the government with reservations about its practicality and concern for students' learning in general. Moreover, teachers motivation for embracing national policy was mainly to secure learners academic achievements and or schools benefits (Nixon, Gregson et al. 2008, pages 9-14).

Similarly, findings from Moore, Edwards et al. (2002) and Day et al. (2007) studies showed that teachers did indeed adapt to the government's new national policy despite being faced with substantial professional challenges and personal reservations. In the Teacher Identities Project, Moore, Edwards et al. (2002) investigated 80 teachers at nine schools with pupils age ranged between 5 to18 years olds. Findings from this study showed that teachers had described themselves as

being both pragmatic and eclectic when adopting new national policies into their practice. And as, Moore, Edwards et al. (2002, page 552) described:

> "[...] almost all of our respondents talked of the ways in which they had modified previous practice to 'bring it in line with' current policy, or had found ways of incorporating current policy into a largely unaltered continuing practice."

Moreover, according to Day and Gu (2007), teacher identity consists of three interrelated dimensions that is (1) *professional dimension*, which reflects on the social and national policy expectations of teachers regarding what content should be taught in the classrooms and how it should be delivered by teachers in particular; (2) *situated dimension* that related to schools and teachers local conditions for example, students' behaviour; and, (3) *personal dimension*, which was based on teachers' lives outside the school regarding their family and social roles. Hence, it was explained that in-balances in one or more of the dimensions (teacher identity) would cause tension on the wellbeing of teachers as well as their classroom management, commitment and resilience (Day and Gu 2007, page 431).

Consequently, teaching in the 21st century is rated as one of the most stressful professions (PWC 2001; Kyriacou 2003; Deakin, James et al. 2010). For example, in Kyriacou (2003) book entitled "Stress-Busting for Teachers", ten common sources of stress were reported by teachers. In this book, issues relating to time pressures and workload of teachers and their coping with change were also listed among the ten common sources of stress. The changes made to the working practices of teachers mainly through the government's educational policies on teaching methods and assessments were described by Kyriacou (2003, page 28):

> "There is little doubt that the frequent changes which have occurred in curriculum content and teaching methods, coupled with the introduction of greater accountability and public assessment of teachers' performance, have generated a great deal of stress."

Additionally, in the Teachers' Workload Diary Survey 2010 of two thousand one hundred and seventy nine teachers (164 schools), it was reported that teachers *would like to spend more time doing* activities such as planning, spending more time with pupils and preparing resources. Interestingly, the activities that teachers were *unable*

to do but considered as part of their role also included planning, delivering better lessons and preparing displays. What's more, activities that teachers *liked to spend less time doing* included planning, preparing displays and making/finding resources (Deakin, James et al. 2010, page 27).

Consequently, findings from Deakin, James et al. (2010) and indeed Kyriacou (2003) does evidently highlight the professional challenges of teachers in meting government's new educational policy (personalisation of learning) and their need for preparing teaching materials (Deakin, James et al. 2010, page 27).

1.5 Government's educational policy and web technologies in the 21st century

Since the beginning of the 1990s, the UK government has set about incorporating Web technologies/services into the compulsory and post-compulsory education systems in order to accommodate students' educational learning needs and preferences in the 21st century. As the then Secretary of State for Education argued the following in 2005:

> "I am particularly excited by the idea of giving every student and learner a personal online learning space where they can store their own course materials and assignments in digital form, and record their achievements […] I am also excited by the possibilities of new digital technologies to help us develop more tailored and personalised children's services." Ruth Kelly (DfES 2005b, pages 2-3)

The Internet is also known to have 'revolutionised' the way in which knowledge is transferred between teachers and learners.

> "We're moving away from the idea of organising knowledge through trees […] We are pulling the leaves off the tree and making a huge pile online consisting of every type of resource, idea, artwork and creativity there is, and adding every piece of metadata that we can and linking them all up." Weinberger, cited in (Allen 2006, page 29)

Accordingly, in this section, the initiations and educational policies of the UK government in Information Communication Technology (ICT) and Information Technology (IT) are briefly reviewed in order to provide the background information about the teaching practices of teachers working in the United Kingdom and in their daily classroom teaching. This brief review includes an introduction to the

'Department of Education and Skills (DfES) policy', 'Educational Department's Superhighways Initiative (EDSI)', 'National Grid for Learning (NGfL) policy' and the 'ICT in Schools Policy'.

- Department of Education and Skills (DfES) policy

On 15th March 2005, the Department of Education and Skills (DfES) published the current e-Strategy entitled '*Harnessing Technology; Transforming Learning and children's services'*. This document was aimed at personalising the educational system in the UK at four sectors; (1) Schools, (2) Post-16, (3) Higher Education and (4) Children's Services, for the next fifteen years through the use of digital and interactive technologies. This objective was then translated into the following four actions:

- "Transform teaching, learning and help to improve outcomes for children and young people, through shared ideas, more exciting lessons and online help for professionals;
- Engage 'hard to reach' learners, with special needs support, more motivating ways of learning, and more choice about how and where to learn;
- Build an open accessible system, with more information and services online for parents and carers, children, young people, adult learners and employers; and more cross-organisation collaboration to improve personalised support and choice;
- Achieve greater efficiency and effectiveness, with online research, access to shared ideas and lessons plans, improved systems and processes in children's services, shared procurement and easier administration." (DfES 2005a, page 5)

The objective also included the following six priorities:

1. "An integrated online information services for all citizens
2. Integrated online learning and personal support for children and learners
3. A collaborative approach to personalised learning activities
4. A good quality ICT training and support package for practitioners
5. A leadership and development package for organisational capability in ICT
6. A common digital infrastructure to support transformation and reform." (DfES 2005a, page 5)

Moreover, under the e-strategy the vision of the government is that schools would be able to provide further support to pupils and all other educational stakeholders with the availability of the Internet across the educational spectrum. For example, under priority number one, schools are required to "Provide information portals for citizens, parents, carers, employers, and learners."; for Post-16's it is required to

"Develop a workforce Web portal for information, advice and guidance on e-learning."; and for the children's services the government is set to provide information for children and young people through the "need2know" website at "www.need2know.co.uk" and the parent's central website at "www.ukparents.co.uk" (DfES 2005).

Indeed, the Harnessing Technology strategy holds upon a series of preceding policy drives to support the Internet use of teachers that includes the 'ICT in Schools Policy' from 2001 to 2005, 'National Grid for Learning' (NGfL) from 1998 to 2002 and 'Educational Department's Superhighways Initiative' (EDSI), which was initiated by the Conservative government in 1995.

- ICT in Schools Policy (2001-2005)

On 21st May 2003, new ICT policies for schools was launched by the Education Secretary, Charles Clarke in the document entitled "Fulfilling the Potential – Transforming teaching and learning through ICT in schools". In this three year programme (2003-2006), schools' next developmental plans after the National Grid for Learning (NGfL) programmes regarding ICT (Information and Communication Technology) and e-Learning were outlined. Schools plans were further highlighted by Teachernet (2003):

> "To build on the considerable achievements of the NGfL and ICT must become an integral and natural part of the learning process. The next stage is to ensure that for all schools ICT makes a significant contribution to teaching and learning across all subjects and ages and inside and outside the curriculum."

In addition, the 'Curriculum online' was launched in January 2003 to further improve standards of schools in the UK by encouraging the use of digital resources among teachers in their classrooms. The main objectives of this website were outlined by Curriculum Online (2005, n.p):

> "The main objectives of Curriculum Online are to help teachers to find digital learning resources for use in the classroom, and to promote the supply of new and innovative resources for schools."

In this project, a total of one hundred million pounds worth of eLearning Credits (eLCs) was funded by the government to schools for the purchase of their online

resources. This funding was allocated to schools between the years 2003 and 2006 (Kitchen, Dixon et al. 2006, page 7).

Finally, developments in online resources include the introduction of 'National Digital Resource Bank' (NDRB), Harnessing Technology strategy in the UK. This repository is aimed at providing teachers with quality assured and copyright safe online resources:

> "The NDRB is essentially a gigantic online swapshop. If it works, teachers will hit "Search" and gain access to resources designed and tested by their 400,000 colleagues across the country. Hours spent concocting lesson plans late into the night will be a thing of the past. Students will also be able to download educational videos, exercises and audio clips. And, unlike what Google throws up, everything will be quality assured and copyright safe." (Davis 2009, page 1)

The interface designed for the NDRB was described by Fiona Iglesias, project manager (Davis 2009, page 1), as being simple and easy to use:

> "[…] teachers will barely need any training to use the new resource. A simple Google-like interface will allow teachers to search for whatever they want. They can refine their search by key stage and subject, as well as selecting whether they want a full lesson plan, or a video, activity or resource to slot into an existing agenda. A star rating like that used by eBay will allow teachers to rank resources they have tried and approved, encouraging."

However, on the 30th September 2011, the NDRB Website was closed down. The project termination was due to lack of funding for its hosting costs. This decision was further explained by Sirius (2011, n.p), the technical support:

> "At the moment we are not aware of any sponsors able to help cover the hosting costs at Janet, and so it is with deep regret that we will need to shut down the NDRB service at this time. Our current plan is to decommission the hosting servers and archive the content onto a set of DVDs with the hope that someone else will be able to benefit from the collection created to date."

- National Grid for Learning (NGfL)

The National Grid for Learning (NGfL) policy was a four year programme (1998-2002). This policy was initiated by the UK government in October 1997 in order to improve school standards especially with regards to their 'literacy' and 'numeracy'

curriculum, so that "[…] learners in the various home countries of the UK can access information most directly relevant to their local education systems." (Bates 1998, n.p). The creation of the NGfL policy was closely related to the United State's idea of a 'Community Learning Utility' (Baker 1997). Hence, the NGfL was defined as:

> "- A way of finding and using on-line learning and teaching materials. - A mosaic of inter-connecting networks and education services based on the Internet which will support teaching, learning, training and administration in schools, colleges, universities, libraries, the workplace and homes." (DfEE 1997a, page 3)

The NGfL policy targets were to achieve the following outcomes:

- "by 1999 all Newly Qualified Teachers would need to become ICT-literate to mandatory standards to receive the award of Qualified Teacher Status;
- by 2002 serving teachers should generally feel confident, and be competent to teach, using ICT within the curriculum;
- by 2002 all schools, colleges, universities and libraries and as many community centres as possible should be connected to the Grid, enabling perhaps 75% of teachers and 50% of pupils and students to use their own e-mail addresses by then;
- by 2002 most school leavers should have a good understanding of ICT;
- by 2002 the UK should be a centre for excellence in the development of networked software content for education and lifelong learning […] and a world leader in the export of learning services; and
- from 2002 general administrative communications to schools and further higher education bodies by the UK Education Departments, Ofsted and non-departmental public bodies, and the collection of data from schools, should largely cease to be paper-based." (DfEE 1997a, page 24)

The NGfL policy was implemented throughout the UK (England, Northern Ireland, Scotland and Wales). For example, in England, under the ICT (information and communications technology) training programme more than four hundred and eighty five thousand teachers and school librarians signed up for training (BigLotteryFund 2002, n.p). The NGfL policy was focused on teacher developments, the school sectors and indeed lifelong learning via three main strands (DfEE 1997a):

1. Infrastructure and service for networked learning – this was done through the development of the 'National Grid' website for learners to use. This programme was also closely linked to the government's plans for ICT training which was funded through the National Lottery.

2. Software and content development – the Grid intended to bring national and local museums, galleries, libraries and content developers to digitalize and

distribute their resources online. NGfL's first prototype was launched on the 14th January 1998 and provided resources to all educational sectors that are school learners, further education, higher education, libraries and lifelong learners.

3. Teacher training programmes – this was achieved through the development of a 'Virtual Teacher Centre' (VTC) and a unique database. Under this training programme, teachers and librarians were educated via the Grid (website) about the appropriate and successful ways of using ICT in the classroom for delivery of their subjects and possibilities of differentiating education for children with special needs.

This programme was funded by 'The People's Lottery'. Moreover, in a White paper produced by the Labour government (outlining their new educational plans for the country) the New Opportunity Fund (NOF) was introduced as the 'sixth good cause' eligible for lottery funding covering areas of 'health', 'education' and the 'environment'. Initially more than three and half billion pounds of the lottery money was divided equally between Charities, the Arts, Sports, the Heritage and the Millennium in order to fund projects all over the country that was for the following purpose:

> "[…] To use this new Fund initially to train teachers and librarians to help of all ages learn, using new technology to build up out of school activities for children; and to establish a network of healthy living centres across the nation." (Lloyd 1997, n.p)

Under the NGfL programmes, almost all schools were connected to the Internet with over a quarter using broadband connections. NGfL also provided continuous professional developments (CPD) and leadership programmes in ICT for teachers to participate with almost all schools (99%) having signed up for or completed training. Teacher confidence in the use of ICT in their classroom teaching (curriculum) was also improved and funding was provided to give computers to over one hundred thousand teachers. Furthermore, the online curriculum was launched for teachers to search and purchase online resources for their classroom teaching from both public and private suppliers. Together with, the establishment of over six thousands UK online centres (over two thousand Learndirect centres) aimed at providing access to ICT in the community (DfES 2003b, page 6).

However, despite success of the Grid, the NGfL website (gateway to education resources) and the NGfL Scotland are no longer active. This move was mainly due to advances in new Internet technologies and the active involvements of schools in developing and sharing online teaching resources (Teachernet 2003).

> "What has tended to happen is that local authorities or regional consortiums have developed high-speed links between their schools, which are still flourishing […] When the grid began, most local authorities did not have their own systems for collating or searching material - now they did." cited by (Eason 2006, n.p)

- Educational Department's Superhighways Initiative (EDSI)

The Educational Department's Superhighways Initiative was a project initiated by the Conservative government in 1995 to investigate possible ways in which communication technology could be used in education and indeed to support future educational needs. The EDSI constituted of 25 educational projects; 19 in England, 2 in Wales, 2 in Northern Ireland and 2 in Scotland, with a budget of more than twelve million pounds. The participants for these projects consisted of over four hundred and eighty institutions in primary schools, secondary schools, colleges and higher education, and more than one hundred and fifty thousand learners (EDSI 1999, page 2). The aims of the EDSI evaluations were:

- "To assess the potential of intermediate and broadband technologies to enrich teaching and learning in a variety of contexts including school, college, at home or in the workplace;
- To identify those services and applications that provide the greatest benefit;
- To identify optimum conditions and strategies for the successful implementation of broadband networks, services and applications and to disseminate those lessons;
- To recommend future directions for industry and the education service for the wider implementation of such networks as they become available and affordable." (EDSI 1999, pages 2-3)

The 'Descriptions', 'Aims and outcomes', 'Sponsors' and 'Costs and cost benefits' of each project can be found in Becta's reports and publications, archives and websites (EDSI 1999).

Moreover, the findings obtained from these projects were used to develop more advanced educational systems called the National Grid for Learning (EDSI 1999, pages 2-3).

Therefore, it can be apparent from the government's ICT and IT initiations and its policies (discussed in their review) that the Internet is an important part in transforming education in the 21st century. Since, it is the government's expectation of teachers to use the Internet and online resources in their classroom teaching, given that teachers are the main (and perhaps the most important) end-users in the government's ICT policy agenda.

Teachers are the first group of users exposed to new teaching practices and technologies in education, which are often introduced through compulsory teacher trainings and new curriculum standards, This, therefore, makes teachers the pivotal point of all the government's educational policies and indeed the key implementers of their system seeing that teachers are the facilitators and mediators between students and the new educational technologies outlined by the government.

1.6 Discussion

In this chapter, it was discussed how the Internet is now considered to be an integral facet of contemporary life – easy to use and that the Internet is one of the ICT tool requirements of the individual user.

Moreover, due to technology advancements of the Internet and search engines together with the government's educational policies and its initiatives for incorporating online systems or activities (among users such as teachers, students and parents), the Internet is undoubtedly an important part of our society in the 21st century and indeed teaching profession.

Consequently, based on the government's ICT policies and its initiatives, the individual teachers is expected to use the internet and online resources in their classroom teaching, given that teachers are the main (and perhaps the most important) end-users in the government's ICT policy agenda.

Implications of the study

Teachers are the first group of users exposed to government's new ICT policies and its initiatives as individual teachers are required to adapt new practices and technologies into their classroom teaching through compulsory teacher trainings and new curriculum standards. This makes teachers the pivotal point of all the government's educational policies and indeed the key implementers of their system seeing that teachers are the facilitators and mediators between students and the new educational technologies outlined by the government.

Hence, for teachers to fully embrace the government's ICT policies in their classroom teaching and indeed to ensure their continue use of ICTs such as the Internet especially online resources, there need to be a better understanding of teachers' classroom use of the Internet and online resources, in the 21st century education. In addition to leaning about the kind of *technical supports* teachers need in the UK, in particular, when *searching the Internet* for online teaching resources.

This level of support can only be achieved through a better understanding of the online searching needs, practices of teachers and their individual teaching preferences when incorporating online resources in their classroom teaching.

1.7 Conclusions

This review has established that further research is required in the area of information needs and search behaviours of teachers. This should consider the Internet use of teachers in the classroom teaching, the online searching practices of teachers and their schools ICT training programmes in order to provide teachers with the much needed technical support, particularly for those in the UK. For example, studies could be initiated by reviewing the barriers associated with the use of ICT tools by teachers in their classroom teaching (Seyedarabi 2012) and the efficiency of Web searching by teachers in the 21st century education (Seyedarabi 2011), respectively.

In addition, researchers may investigate the creation, re-use and access of educational contents online. Access to online resources includes studying the interface design of the educational and generic search engines together with their returned search results. In the following chapter of this thesis, the barriers faced by teachers when using the World Wide Web and, when integrating online resources into their classroom teaching will be reviewed.

Chapter 2

The barriers associated with the technological needs of teachers in the 21st century education

This chapter reviews barriers associated with the use of ICT tools by teachers in their classroom teaching at 'technical', 'teacher' and 'school' levels. There has been much work carried out on easing ICT and internet barriers through resourcing and teacher training. However, there is less work on the sort of technology that teachers would like to use for their teaching, particularly when searching online for teaching resources. Hence, a call for further research in web 'personalisation', an emerging direction that is currently adopted by technologists and the government, is advocated as a possible solution to the technical barriers of teachers.

2.1 Overview

Since the beginning of the 1990s, the UK government has set about incorporating web related technologies and resources into the compulsory and post-compulsory education systems in order to accommodate the educational needs and preferences of students, in the 21st century (Allen 2006; Kitchen, Dixon et al. 2006; DfES 2005; DfES 2003; EDSI 1999; Baker 1997; DfEE 1997). This led to many positive outcomes, for example, in the BESA internet survey of ICT in UK State Schools, it

was reported that the confidence and competent level of primary and secondary teachers using ICT in the curriculum was seventy and sixty percent, respectively (BESA 2009, page 5).

However, despite the government's massive investment in ICT-related projects for the teacher training programmes and transformation of schools, inconstant integration of ICT in classroom teaching was reported. For example, in the Becta's 'Leading Next Generation Learning 2009' review, the following was reported:

> "There are many examples throughout the education and skills sectors of successful adoption and deployment of technology. However, overall we have not seen technology fully embedded in a way that has transformed our basic processes or the dominant operating and delivery models, and yet other sectors have achieved just that." (Crowne, 2009, page 2)

Furthermore, Ofsted (2008, page 2) reported the following:

> "Most schools [primary and secondary] in the sample had a wide range of ICT resources for use in lesson. However, too often the training of teachers and teaching assistants had not kept pace, with the result that these resources were not used to their full potential." (Ofsted, 2008, page 2)

Hence, seeing that in practice teachers are faced with a number of obstacles and challenges when using ICT, researchers have now turned their attention to factors influencing the ICT usage of teachers and schools (Cartwright, Hammond et al., 2007; Hennessy, Ruthven et al., 2008).

Aims of the review

The aim of this review is to highlight the fact that there is currently *less research work on ICT barriers or the kind of technology teachers* need for adopting ICT tools in the 21st century education. The ICT related barriers of teachers need to be addressed through further research on the sort of technology that teachers would like to use in their classroom teaching, particularly when searching online for teaching resources.

Process of the review

In this review, *barriers* associated with the use of ICTs in classroom teaching are outlined from the perspective of teachers. Moreover, issues surrounding the internet use vs non-use of teachers in the classroom are reviewed within the wider teaching

context. Hence, studies relevant to the ICT barriers of teachers are discussed within the following three interrelated aspects or levels of classroom teaching: (1) technical, (2) teaching and (3) school.

2.2 Technical–level barriers

A number of technical issues are raised in the literature regarding the non-use of ICT by teachers in the classroom. For instance, in the recent SITES (Second Information Technology in Education Study) investigation of the use of ICT in education school principals, technology coordinators and teachers in mathematics and sciences were surveyed using an online questionnaire. This study involved an approximately four hundred schools and about four teachers per school in each participating education system and was carried out among twenty two countries (Law, Pelgrum et al., 2008, page 9). The findings obtained from this study showed that teachers could not achieve all their pedagogical goals in their classroom without the aid of ICT equipment and tools:

> "Teachers cannot realize certain pedagogical goals unless information technology equipment and tools are available to them. They need not only sufficient equipment (PCs, printers, internet connections), but also ready access to software tools (for word-processing, communication, information retrieval) and communication facilities (e.g., email addresses for teachers and students)." (Law et al., 2008, page 74)

The SITES study has also identified a number of ICT related obstacles at technical, teaching and or school related levels. For example, (1) Lack of ICT-tools for science laboratory work, (2) Insufficient ICT-equipment for instruction, (3) Not enough digital educational resources for instruction and, (4) Insufficient time for teachers to use ICT were identified as the four main obstacles that were holding schools that is teachers from achieving all their pedagogical goals (table 1).

ICT related Obstacles	percentage of obstacles selected by schools' principals
Lack of ICT-tools for science laboratory work	40
Insufficient ICT-equipment for instruction	31
Not enough digital educational resources for instruction	31
Insufficient time for teachers to use ICT	30
Insufficient qualified technical personnel to support the use of ICT	29
Insufficient number of computers connected to the internet	27
Insufficient budget for non-ICT-supplies (e.g., paper, pencils)	25
Teachers' lack of ICT-skills	23
Computers are out of date	21
Insufficient internet bandwidth or speed	21
Lack of special ICT-equipment for disabled students	20
Insufficient or inappropriate space to accommodate the school's pedagogical approaches	19
Prescribed curricula are too strict	19
Pressure to score highly on standardized tests	18
Using ICT for teaching and/or learning is not a goal of our school	6

Table 1: Average percentages of obstacles selected by schools' principals across 22 education systems. These obstacles hindered the realization of schools' pedagogical goals "a lot" (Law, Pelgrum et al., 2008, page 96)

Moreover, in a small scale but equally relevant study, Morris (2002) investigated the use of technology in the classroom by studying twenty eight teacher practitioners, within fifty miles of the Pittsburgh State University (USA).

In this study, eighteen female and ten male teachers from fourteen primary and secondary schools were surveyed using questionnaire surveys and classroom observations (Morris, 2002, page 4). The results from this study showed that problems associated with 'user-friendliness', 'availability' and 'access' were the main reasons for the lack of teachers ICT integration into their classroom teaching (Morris, 2002).

> "[…] 'easy access' to technology was enjoyed by fewer than a handful of participants. Limited computer lab time [for] students, the absence of technology correlated to objectives and tests for the district [follow-up materials], and the lack of multiple, up-to-date computers in the classroom challenged the majority of the teachers' efforts to integrate technology into the curriculum in a systematic, viable way." (Morris, 2002, pages 14-15)

In this section, past studies related to the ICT obstacles of teachers at technical level were described. Findings from these studies suggested that teachers are unable to fully benefit from the available ICT developments in their classroom teaching. In addition, the handful number of studies described in this section highlights the fact that there is currently *less research work* on this topic, which should be addressed through *further research in the kind of technology teachers need for adopting ICT tools* in the 21st century teaching. This could include developing tools that can support the internet of teachers and their access to online resources in their day-to-day classroom teaching.

Other, studies relating to the ICT barriers of teachers at 'teacher–(user) level' and 'school–level' will be briefly outlined from the wider teaching context in the following sections of this chapter, respectively.

2.3 Teacher (user)–level barriers

In the face of many recent studies reporting the benefits of teachers using ICT and the internet in classroom teaching like the 'Harnessing Technology in Schools Survey' (Kitchen, Finch et al., 2007), Lindsay, Muijs et al. (2006) and Becta, (2007a), evidence shows that teachers are still faced with a number of barriers when incorporating internet into their curriculum. For example, 'insufficient time for teachers to use ICT' and 'teachers' lack of ICT skills' were reported by Law, Pelgrum et al. (2008).

Moreover, in a national survey carried out by NetDay (2001) in Australia, six hundred public and private school teachers were surveyed with regard to their usage of internet and technology in their classroom teaching. The study reported that despite the enthusiasm and openness of teachers to new technologies and the internet, ICT has not been successfully integrated into the education system in order to benefit

the learning outcomes of students. This finding is further highlighted in the following (NetDay, 2001, n.p):

> "- Teachers are using computers & the Internet primarily as research tools.
> - Teachers value technology and are comfortable with the Internet and technology but are not using it within instruction.
> - The potential of technology and the Internet to revolutionize education has not been effectively leveraged for education results."

Also, the following was reported by Rogers (2003, page 3) on the experience of science teachers using ICT:

> "I prepared a worksheet in advance which contained step by step instructions on how to access the site. I also gave the pupils specific questions to answer in order to reduce browsing. I also allocated a particular planet to each group (3-4 pupils) to avoid information overload."

Additionally, the six main constraints of teachers for their lack of internet use in the classroom teaching were identified as (1) lack of knowledge about good access, (2) lack of good lessons that use technology, (3) lack of knowledge about how to use the web effectively, (4) too much information, (5) inappropriate material on the web and finally (6) lack of leadership from the principle or administrators (NetDay, 2001, n.p). Other studies included Guha (2003), who identified the main obstacles for using computers in classroom teaching.

In this study, the causes of comfort or discomfort of 149 primary teachers in Western New York were surveyed. This also included interviewing five of the "more comfortable" and five of the "less comfortable" teachers about their use of computers in their classroom teaching (Guha, 2003, page 318). The findings from this study showed that obstacles facing teachers who were less comfortable with using computers in their classroom teaching were 'lack of computers in classrooms' and their 'computer phobia',

> "Our biggest problem is that a lot of teachers are afraid of computers. Several resources are available. To become more aware of computer' ability, teachers need not be afraid of computers but should learn them. With technology changes it is difficult for teachers and schools to keep up with." (Guha, 2003, page 329)

On the other hand, lack of 'time management', 'lack of computers in their classrooms' and 'lack of computer training' were identified as the main barriers for teachers who were more comfortable with using computers in their classroom teaching (Guha, 2003).

The internet use of teachers in their teaching was further investigated in Madden, Ford et al. (2005, page 270) survey of 188 heads of departments (aged between 24 to 60 year olds) in secondary schools, in Sheffield. For example, it was reported that,

> "[...] fewer than half of the teachers agree with the statement 'I have no problems finding web sites that will be of use in my teaching'."

In this study, Madden, Ford et al. (2005, page 269) stated that teachers have concerns about websites' reliability and quality of online resources, as,

> "Teachers [were] concerned that 'Web sites too often change or go off-line without notice' [...] also tended to feel that 'The content of sites is too unreliable to be of use' [...] and that 'The material on the Internet is inappropriate for the National Curriculum'."

Furthermore, Madden, Ford et al. (2005, pages 271-272) explained that when using the internet in teaching, teachers were more concerned about their classroom management skills than their ICT skills. Thus, the classroom management skills of teachers were identified as a possible obstacle to using the internet in classroom teaching. Madden, Ford et al. (2005) also concluded that head teachers' (respondents) lack of internet experience and confidence in using the internet was due to their age:

> "The youngest of today's teachers, therefore, would have had little more contact with ICT at school (except for certain technical applications) than would their older colleagues. They would, however, have had opportunities to explore the potential of the technology at college and university. When they began work, the Internet would have been available for them to incorporate into their teaching. Their older colleagues, by contrast, would have needed to change existing patterns of teaching in order to use it." (Madden, Ford et al., 2005, page 273)

Therefore, it was predicted that the internet use of teachers in their teaching will rise rapidly through sharing and or exchanging knowledge online (Madden, Ford et al., 2005). This finding is also in line with the BESA (2007) survey of ICT use in UK

schools, as lack of time and classroom management was only identified by a relatively small group of teachers:

> "16% of primary and a fifth of secondary schools identify class control issues as one of the pitfalls of using ICT in the classroom. A similar number have concerns about the effect of ICT on the reduction of available teaching time." (BESA, 2007, page 10)

Despite the fact that findings from studies like the Larner & Timberlake (1995) go back to more than ten years ago, NetDay (2001) findings to eleven years ago and Guha (2003) findings to nine years ago, problems associated with teachers' lack of ICT and internet usages still remains to be fully determined. For example, Sorensen, Twidle et al. (2007) conducted a longitudinal study of the beliefs and attitudes of teacher trainees and their use of the internet in classroom teaching, in England. In this study, problems associated with limited pedagogical guidance and the availability of good role models were said to be unresolved since the internet:

> "[…] use remains fairly limited and there is not clear understanding of what constitutes good use of the Internet." (Sorensen, Twidle et al., 2007, page 1620)

Furthermore, it was reported that problems associated with the execution of lesson plans have also resulted in the lack of internet use by teachers in their classroom teaching. For example, the time taken to identify good websites at the right educational level was identified as one of the causes for teachers lack of internet use (Twidle, Sorensen et al., 2006, page 218). The need for more teacher support is highlighted in the following statement:

> "overall I think the Internet is a brilliant resource but [teachers] need more support." said one teacher, cited in (Twidle, Sorensen et al., 2006, page 219).

This finding is also in support of Law, Pelgrum et al. (2008) findings, as in their study 'Insufficient time for teachers to use ICT' was highlighted to be the third most selected obstacle that contributed to holding back schools (school teachers) from achieving all their pedagogical goals. Moreover, in the 'Harnessing Technology, Preliminary Review 2008', the following was reported:

> "A lack of time, willingness or the resources to develop new pedagogical approaches is a major barrier to fully exploiting the educational potential of digital technology." (Chowcat, Phillips et al., 2008, page 20)

Similarly, Hennessy, Ruthven and Brindley (2008) investigated the ways in which internet is integrated into teachers' daily lesson plans by carrying out 18 group interviews among secondary teachers of the core subjects English, Mathematics and Science, in England. The selected teachers were from six state secondary schools, all located within fifty miles from Cambridge (Hennessy, Ruthven et al., 2008, page 11). In this study, it was concluded that the lack of ICT integration of teachers into classroom teaching (into their particular subject area) was due to factors affecting their individual commitment and indeed educational reflective and critical outlook. For example, teachers expressed their concerns about the educational value of incorporating ICT related activities or a particular technology into their classroom teaching. Teachers also had concerns about the way a technology can be integrated into their schemes of work and consistency in types of use between departmental colleagues (Hennessy, Ruthven et al., 2008, page 32).

Additionally, the ICT use of teachers into classroom teaching and indeed their school practice can also be influenced by their taught 'subject', 'departmental cultures' and individual teaching preferences, which can ultimately affect the teaching style and assessment criteria of individual teachers as well as resources they select for their classroom teaching. The importance of subject subculture on schools and on the practice of teachers is highlighted in the followings:

> "Research that has been carried out in this area indicates that subject subculture has a very strong influence on school organization and practice." (Selwyn, 1999, page 30)

Accordingly, studies (Moss, 1992; Pelgrum and Plomp, 2001; Watson, 1993) have reported that the level of computer use (IT) by teachers in their classroom is different from one subject to another. Nevertheless, in the Selwyn (1999) study of subject cultures on different educational contexts it was concluded that achieving a balanced distribution of IT or computer usage among different subject teachers will not be feasible but instead findings from studies in subject cultures can be used to assist relevant parties i.e. governmental bodies to make better informed educational decisions and or planning across different subject areas.

> "[…] it is unlikely that IT will ever be totally integrated into every subject area. Nevertheless, awareness of the reasons underlying these different reactions to IT will help to reduce the 'clash' between individual subject cultures and the culture of educational computing." (Selwyn, 1999, page 46)

Further to the above discussion on the ICT barriers of teachers at teaching level, the following section of this review will outline the ICT related barriers of teachers at school level.

2.4 School–level barriers

In BESA (2009) report, it was stated that,

> "English primary schools are expected to budget £39 million on curriculum software and digital content in 2009-10 […] English secondary schools are expected to budget £45 million on all curriculum software and content in 2009-10." (BESA, 2009, page 5)

However, despite the government's continued investments in schools ICT equipments and teaching resources, teachers are still faced with a number of school-level barriers when incorporating internet into their teaching. For example, schools lack of teacher support and internet access was reported in the 'Harnessing Technology Review 2007' (Becta, 2007a).

The lack of end user support was further reported by Becta (2007b, page 14), as only twenty seven percent of the primary teachers were reported to have received technical support when using the internet in addition to thirty three percent of the primary schools having problems with their internet (broadband) connections. (Becta, 2007b, page 14)

Other problems include establishing links between different learning platforms and the Management Information Systems (MIS). The schools use of learning platforms and MIS was outlined in the following:

> "Very few schools with learning platforms have a link to the school MIS, and numbers are low (33 per cent) for FE colleges." (Becta, 2007a, page 68)

Lack of ICT computer access was highlighted by BESA (2009) and Ofsted (2008) survey. For example,

> "80% of primary and 90% of secondary school teachers suggest that limited access to ICT is affecting their use of ICT in the classroom. 39% of primary and 41% of secondary schools indicate limited access to computers in the classroom." (BESA, 2009, page 5)

Also decline in the confidence of teachers was highlighted by Madden, Ford et al. (2005) and Ofsted (2008) survey. For example, Madden, Ford et al. (2005, page 272) explained that in his study:

> "The proportion of teachers confident in their ability to use the Internet (72%) was notably less than the national average in 2002. According to DfES statistics (2003), 81% of teachers in 2002 felt 'confident to use ICT in their subject teaching'."

However, the ICT training of teachers was to some extent improved, as in BESA (2009, page 5) it was observed that:

> "59% of primary teachers will receive ICT training in 2009, compared to 67% who expected training in 2008. 55% of secondary teachers will receive training in 2009, compared to 72% in 2007. For those teachers receiving ICT training, around 71% of primary and 63% secondary school teachers found it very useful, with all but 7% of primary and 9% of secondary school teachers finding it of some use."

Furthermore, in a smaller scale but equally relevant study, Twidle, Sorensen et al. (2006) investigated the use of the internet by trainee teachers involving 128 student science teachers studying for their Post Graduate Certificate of Education (PGCE) at five English higher education institutions. In this study, the attitudes towards and experiences, competence and confidence of trainee teachers were studied using a questionnaire survey and a selection of structured interviews and observations. Based on this investigation, lack of 'technical support' and 'access' to the internet were identified as the two main problems linked to teacher trainees' lack of internet use in their classroom. For example, the authors explained that:

> "[…] the key is to find the right sites at the right level. Even then there can be problems with the school blocking particular sites." said one teacher, cited in (Twidle, Sorensen et al., 2006, page 218)

Hence, to support teachers with the use of online resources in their classroom teaching, a call for further research was made into the ways of using the internet in relation to the requirements of pedagogical factors for executing a successful lesson i.e. finding online resources that are related to the teaching topic and curriculum teachers as well as their students' educational level or learning needs (Twidle, Sorensen et al., 2006).

Additionally, Twidle, Sorensen et al., (2006) findings were used to pursue a longitudinal study of the beliefs, attitudes and internet usage of teacher trainees, in England (Sorensen, Twidle et al., 2007, page 1620). Findings from Sorensen, Twidle et al., (2007) were discussed in the 'Teaching–level barriers'.

Moreover, according to Cuban (2001), the computer usage of teachers in their classroom teaching was mainly to complement their existing teaching materials or practices rather than to create new innovative ways of practicing their teaching. Cuban included that the concept of computers as a new piece of technology for improving classroom teaching has been heavily advertised by the government and indeed the technology developers without actually thoroughly planning its integration into the daily teaching practices of teachers (Cuban, 2001).

> "[…] I have concluded that computers in classroom have been oversold by promoters and policymakers and underused by teachers and students." (Cuban, 2001, page 195)

Similarly, according to the Ofsted (2002) report, the internet and online teaching resources were found to be used by teachers to enhance their classroom teaching and not as a replacement. Teachers asked their students to search online for relevant materials like text, pictures and sounds in order to design word documents or to prepare for class presentations. The internet use of teachers was further described by Ofsted (2002, pages 4-5):

> "It is becoming increasingly common for Key Stage 2 pupils to use ICT for displays and presentations. For example, in one primary school, Year 6 pupils gave an effective presentation of a story to Year 1 pupils using text, sounds and pictures."

Other examples included that of VanFossen (1999), who investigated the internet use of secondary and post-compulsory teachers in Indiana. In this study, a questionnaire survey was mailed to 350 randomly selected teachers that was drawn from a list of 4,103 high school and middle school teachers in the public and private schools, from which a total of one hundred and ninety one responses were received (Vanfossen, 1999, page 1).

Hence, Vanfossen (1999) reported that the lack of teachers training in their subject areas concerning their curriculum and pedagogy as well as the lack of schools ICT equipment, internet access rights of students and schools access to the internet are the

most common factors restricting teachers from further use of the internet in their classroom teaching (Vanfossen, 1999). The internet use of the teachers are further outlined by Vanfossen (1999, page 14), which is also in line with Law, Pelgrum et al., (2008) review of teachers' top major ICT obstacles:

> "The most common factors cited included: lack of training in how to apply the Internet to the classroom (59.5%), problems with Internet access in classrooms (47.7%), lack of general computer training (32.7%), concern over students accessing inappropriate materials via the Internet/WWW (30.1%) and lack of Internet/WWW access in the school building (22.2%)."

Accordingly, to increase the ICT usage of teachers, Leach and Moon (2000, page 385), suggested that the government's ICT policies for school improvement could be better implemented within the UK education system, if a stronger conceptualization of teachers' professional knowledge was constructed. Thus, in this model, the individual teachers' 'personal construct' was depicted in the centre of the process and the 'subject knowledge', 'school knowledge' and 'pedagogic knowledge' of teachers were depicted as being the three inter-related factors influencing the professional knowledge or decision of teachers for their use vs non-use of ICT related activities (technologies), when preparing lesson plans (Leach and Moon, 2000). The model was further outlined by Leach and Moon (2000, page 396):

> "Given a concern to encourage the process of teacher development, as well as to change classroom practice and improve the quality of teaching and learning, we believe it is necessary to consider the interaction of the concepts of arenas and settings with what is now understood about teacher knowledge. This includes subject and pedagogic knowledge."

In this model, factors influencing teachers' *subject knowledge* were listed as the essential questions of the subject, networks of concepts, theoretical frameworks, methods of enquiry and symbolic systems, vocabularies and models; *school knowledge* included the process of transformation from subject knowledge, historical, ideological, educational origins and discourse, vocabularies, models, etc. *Pedagogic knowledge* involved teachers' goals of learning, knowledge of learners in the setting, selection of knowledge that is the subject of the learning, selection of learning and assessment activities, resources – human, material, technological, discourse and the teachers' roles and relationships in the classroom teaching. Finally, *personal construct* was outlined as individual teachers' personal view of what

constitutes good teaching (educational goals), view of mind and learning and prior individual experience including culture, gender and ethnicity (Leach and Moon, 2000, pages 396-397).

Interestingly, in the Ofsted latest report, schools ICT policies were also highlighted as an influential factor for the lack of teachers ICT usage in their classroom teaching:

> "More commonly, there were shortcomings in the strategic leadership of ICT. This had a negative impact on all aspects of provision, including infrastructure, curriculum and, most importantly, achievement and standards." (Ofsted, 2008, page 1)

In this report, schools were using ICT for their management of daily activities and the actual integration within the individual schools is not properly planned or included at the infrastructure level (Ofsted, 2008).

Subsequently, the ICT technical related obstacles discussed earlier in this chapter together with teaching and school level barriers are evidence that in reality, teachers are not making the best use of the internet in their classroom teaching. Thus, a proposed new approach or solution to the internet and online resources use of teachers is needed.

2.5 Discussion

In this chapter, barriers associated with teachers' integration of ICT tools in classroom teaching at 'technical', 'teaching' and 'school' levels were briefly reviewed. In this review it was highlighted there has been much work carried out on easing ICT barriers through resourcing and teacher training (Davis 2009; Kitchen, Dixon et al., 2006; DfEE 1997; DfES 2003). However, there is less work on the sort of technology that teachers would like to use for their teaching, particularly in the 21st century education, which undoubtedly would involve accessing educational resources on the internet and searching online for teaching resources.

Teachers' main obstacles to their ICT usages and indeed internet were highlighted as being the lack of technical support for their online search that included using the internet and web searching, teacher training, school resources and teacher allocated time.

Implications of the study

According to the government initiations and policies, teachers should be using the internet in their teaching, especially for information searching and retrieval, but in practice it seems that teachers have not to use ICTs such as the internet in the way it was originally prescribed by the government's educational policies through their initiations and funding. The inconsistent use of ICT in schools was further described in the Ofsted (2009), press release:

> "Government investment and better planning in schools have contributed to improvement in the quality of school information and communication technology (ICT) lessons, yet not all pupils are benefiting, according to a report published today by Ofsted, the Office for Standards in Education, Children's Services and Skills."

Hence, teachers are not all using the internet in a *creative way* to facilitate their classroom teaching.

Recommendation

As shown in sections 2.2, 2.3 and 2.4, the researcher's recommendation is that further research is required in the field of web 'personalisation' for teachers, an emerging direction that is currently adopted by technologists and the UK government (Heppell, 2008; Sunikka and Bragge, 2008; DfES, 2006; Wirken, 2006), particularly needed when using the internet and searching online for teaching resources.

Hence, web personalisation can be adopted as a proposed new approach or possible solution to the technical barriers of teachers. For example, this could include researchers working on design and developing personalised search tools for individual teachers in order to locate, store, share, create and or re-use online resources in their classroom teaching. The need for developing a personalised search tool for teachers is further discussed by Seyedarabi (2011, n.p):

> "[…] studying the web search practices by teachers would also aid researchers to design and develop a model of teachers' web information needs and search behavior relevant to educational software design. This can ultimately be used by search engine designers and or developers to better understand the web searching needs and preferences of teachers, when designing their search tools."

Additionally, it is important to recognize that tackling the ICT obstacles of teachers at technical level cannot be determined in isolation, rather it must also be understood within the wider teaching context or non-technical barriers. For example, students learning needs, teachers' individual preferences and the environment or schools in which teachers work in. Other non-technical barriers such as teachers' 'time pressures', 'lack of ICT tools' (Law Pelgrum et al, 2008) and 'computer access' (BESA 2009, Ofsted 2008) were not investigated in this thesis.

Therefore, given the above understandings and recommendation, the following chapter of this thesis will look at web 'personalisation'; an emerging direction that is currently adopted by technologists and the government, as a 'proposed new approach' or 'possible solution' to web users' better use of the internet. Hence, barriers faced by teachers when using the World Wide Web and, when integrating online resources into their classroom teaching will be reviewed in chapter 3.

Chapter 3

Personalisation: emerging direction for tackling the barriers faced by teachers when searching for educational resources

This chapter reviews literature on web searching by teachers. The aim is to highlight web personalisation as a possible solution to the many barriers faced by web users and in particular teachers. Hence, research on searching requirements and the problems of web users as well as the practical use of some educational search engines will be discussed.

3.1 Overview

In the previous chapter, barriers associated with the integration of Information Communication Technologies (ICT) in classroom teaching were outlined. In this chapter, 'personalisation' will be discussed as one of the emerging themes in the literature for tackling web searching barriers. It will discuss how 'personalisation' is flagged by both the Government and technologists as the way forward in tackling many of the barriers faced by web users in general, and teachers (educational web users) in particular, in their web searching.

This chapter will begin by briefly discussing the design and development of search engines in the last twenty years in order to understand how they have been developed and are still continuing to develop.

3.2 The development of Search engines as an ICT activity

According to Halavais (2009, page 5), a search engine,

> "[…] is usually a system that indexes webpages, […] to include a range of information environments and media forms, including multimedia and other content found on restricted intranets and individual computers."

The first search engine was called "Archie", short for "archives." It was created in 1990 by Alan Emtage, a student at McGill University in Montreal and was designed to retrieve online files by matching users' search queries with the database (Wall, 2007, page 1). Generally search engines have three main parts; 'Spider', 'Index' and 'Search Interface and Relevancy Software'. The spiders are designed to collect, store and update information about web pages onto the search engine's index (catalogue) by looking at the contents, links and changes made to the individual web pages. The search engine software is then responsible for matching search queries with the index (resources in the catalogue) and the ranking of the returned results by placing the most relevant search results at the top of the list (Taylor, 2003; Wall, 2007). The system was further described by Kaushik (2007, page 3):

> "The search engines have a computer program called spider that indexes the list of words found in different web sites. This program further travels through the links connected with different sites and index another set of words. Only those sites that are being harvested by the search engine are opened. The spider searches a copy of the site, and when the user clicks on links, the actual site opens. The spiders are programmed to omit articles that appear in a page and detect terms that appear in titles, subtitles and meta tags."

Thus, as stated by Wall (2007, page 3), processing a single search query would typically require the search engine to perform most or all of the following tasks:

- Accepting the user's inputted query, checking to match any advanced syntax and checking to see if the query is misspelled to recommend more popular or correct spelling variations.

- Checking to see if the query is relevant to other vertical search databases (such as news search or product search) and place relevant links to a few items from that type of search result.
- Gathering a list of relevant pages for the organic (unrefined or personalized) search results. These results are ranked based on page content, usage data, and link citation data.
- Requesting a list of relevant ads to place near the search results.

Examples of other search engines include "Yahoo!" (released in April 1994 as a directory of web sites), "AltaVista" (released in 1995 as part of Digital Equipment's web site), "Google" (released in September 1998); and "Microsoft Live Search" (released in 1998) (Wall, 2007). In 2010, the major search engines 'by unique audience' were identified as Google, Yahoo! Search and Microsoft MSN/WindowsLive/Bing Search (Schofield, 2009b) with Google holding 65% of the total search market (Nielsenwire, 2010).

3.2.1 The meta and specialised search engines

Advancements in search engine technology have enabled developers to design and develop alternative search engines for web users to search the Internet. These search engines include the 'meta' and 'specialised' search engines. With '*meta search engines*' users can send their queries via multiple search engines simultaneously; for example, 'Dogpile', 'IxQuick', 'Metacrawler' and 'Vivisimo'. Thus, in comparison to crawler-based search engines like Google and AltaVista, meta search engines "[…] use the indexes built by others, aggregating and often post-processing results in unique ways", rather than building and maintaining their own web indexes (Sherman, 2002, page 1).

The main advantage of using meta search engines is that users can retrieve and view their search results from different search engines (repositories) with one search rather than visiting each search engine separately, thus, increasing the variety of their search results. However, with these meta search engines, advanced search syntax/options are omitted and search results can be repeated or duplicated (Sherman, 2002), in addition to users experiencing "[…] time outs" and receiving fewer search results. Since meta-search engines:

> "[…] only retrieve the top 10-50 hits from each search engine, the total number of hits retrieved may be considerably less than found by doing a direct search on one of the search engines." (Notess, 2006)

In contrast to 'meta search engines', with '*specialised search engines*', search results are restricted to one particular group of users or databases. For example, 'Become.com' focuses on shopping queries; 'Answers.com' is for queries on referencing information (word definitions, technology explanations); 'MSN's Near Me' is for users with local information queries; Yahoo's 'FareChase' deals with travel queries; 'Google Video' is for video searching and 'Google Maps' is for geographical searching (McLaughlin, 2005).

Examples of recent specialised search engines include 'FindAnyFilm' and 'Kosher'. The 'FindAnyFilm' search engine was developed by the UK Film Council to advise its users on buying (Schofield, 2009a), renting or downloading films and the 'Kosher' search engine was launched in Israel designed to find Jewish dishes and to filter 'forbidden materials' (Butt, 2009). The main motivation behind this specialised search engine was the following:

> "[…] to meet the needs of the country's religious communities and to discourage them from using internet cafes […] [For example] The search engine also has a facility that blocks online shopping during the Jewish Sabbath, which begins at sundown on Friday and ends at sunset on Saturday." (Butt, 2009, page 1)

Specialised search engines also include *academic and educational search engines* like the 'Economics Search Engine' (Baker, 2005), 'Educational World', 'EDinformatics.com', 'SearchEdu.com', 'Education Planet', 'Study Web', 'ERIC', 'National Education Association' (NEA), '4Education', 'The Library in the Sky' and most recently 'Google Scholar'. Specialised search engines tend to index pages for a particular topic or category on the web only, which are often not found in generic search engines. Hence, specialised search engines,

> "[…] will have smaller and more manageable indexes and have a powerful domain-specific search interface." (Steele, 2001, page 1)

Other work in progress search engines include the ‘Newssift’ search engine that was launched by the Financial Times Group in March 2009. Newssift search engine was

described in the Financial Times (Edgecliffe-Johnson , 2009, n.p), as having the following features;

> "Through tagging software and the use of relationship-based or semantic algorithms, Newssift allows users to segment search results by business topic, organisation name, individual, place, theme, news source or sentiment. It scans thousands of global news sources for millions of articles."

With this background information in mind, the following section of this review will discuss studies on individual users' web searching needs and their problems.

3.3 Research on the efficiency of users' web-searching

Further to rapid developments in search engine developments and indeed web users' demand and usage of online resources, there has been growing research interest in investigating users' web searching behaviour. This involves looking at "[…] *what* users are searching for and *how* their information seeking process works" (Rose & Levinson, 2004, page 14).

Much of this research is rooted in earlier work on information literacy skills such as Bates's (1979) concept of the "search tactic […] a move made to further a search." In this, 29 search tactics for users are described to improve their search practices, for example, the 'Reduce' tactic where 'ANDed elements' are reduced/removed from queries or the 'Block' tactic where 'AND NOT' is added to a query (Bates, 1979).

Bates later proposed a new model of searching called "berrypicking" (Bates, 1989). In this model typical search queries were described to 'evolve' and users were considered to commonly gather information in bits and pieces and not by one set of retuned search results/documents. This model used a variety of search techniques and sources, for example, 'Author searching' and 'Journal run', identifying a main journal in an area and searching through relevant volume years. That is, information found at one point in a search may lead in a new unanticipated direction (search moves) and indeed to the development of new goals; the searcher can give higher priority to his/her new goal, thus, user query is said to be modified and/ or changed as relevant information is found along the way.

Berrypicking was used to propose design features for creating databases and interfaces. For example, it was recommended that databases should contain large amounts of text and resources; databases should provide users with simple and easy access; that is searchers should "[…] not have to follow a complicated routine to withdraw from one database and enter another" (Bates, 1989, page 11), and the interface design should enable users (searchers) to bookmark their required information by simply highlighting, storing and printing their selected information and or references (Bates, 1989). In addition, understanding searchers' needs and practices was also highlighted:

> "As the sizes and variety of databases grow and the power of search interfaces increases, users will more and more expect to be able to search automated information stores in ways that are comfortable and familiar to them. We need first, to have a realistic model of how people go about looking for information now, and second, to find ways to devise databases and search interfaces that enable searchers to operate in ways that feel natural." (Bates, 1989, page 13)

Other studies on the search behaviours of web users includes that of Foster and Fords (2003) who looked at the information seeking behaviour of interdisciplinary scholars concerning serendipity. Also in another study by Watson (2008) the searching behaviour of experienced web searchers comprising of five faculty members of the School of Information and Library Science at the University of North Carolina, Chapel Hill and six public librarians was examined to provide searchers the opportunity for serendipitous discoveries.

Furthermore, researchers have also been investigating the perceptions, reactions and feelings of users when searching the Internet for information. For example, the perception and reaction of web searchers in missing potentially important information while searching the Internet was studied by Mansourian and Ford (2007) and their different types of interactions when searching and retrieving online information was investigated by Ellis, Wilson et al. (2002).

Indeed, findings from the above studies on the web searching behaviour of users underline the importance of understanding the searching needs of web users, which will be discussed in the following section of this review.

3.3.1 Research on the web searching needs of users

Studies on the searching needs of web users include Broder's investigation on the cause or reasons behind web searching. In Broder's *Taxonomy of Web Searches*, the intention of users is classified into three classes, 'Navigational', 'Informational' and 'Transactional'. The *navigational goal* corresponded to users who wanted to access some known web sites like the BBC and the *informational goal* represented those users who intended to obtain information assumed to be available on the Web for reading only. Finally, the *transactional goal* described those users who wanted to carry out some web-mediated activity such as downloading files, pictures, videos and searching databases (Broder, 2002).

Following Broder's *Taxonomy of Web Search*, Rose and Levinson argued that the goal of users would fall into a hierarchical structure. After analysing a selection of queries from the AltaVista search engine, the goals for the three levels of hierarchical structure were classified. These levels were entitled as '*Navigational*' (top level), '*Informational*' (middle level) and '*Resource*' (bottom level) queries. According to this hierarchical structure, navigational queries are very much similar to the Broder's taxonomy as the goal of the user is to access web pages of known organizations or institutions. On the other hand, informational queries are used to obtain information about the 'query topic' that involves finding answers to open and or closed questions. Under this level, the user may also search for 'undirected' requests such as getting advice on health related issues or further information about a particular subject area (Rose & Levinson, 2004, page 14-15).

Lastly, resource queries at the bottom level represented those users who wanted to find online materials or learning objects other than information in order to '*obtain*', '*download*', '*entertain*' or to '*interact*' with online resources dynamically (Rose & Levinson, 2004, page 15). A typical resource query for teachers would be to download a course handbook or to obtain lesson plan templates from an educational web site.

Moreover, as was explained by Broder, the navigational and informational needs of users were addressed during the first (1995-1997) and second generation (1998-

1999) of the search engines. That was when more advanced technologies like anchor-text, link analysis and click-through data were introduced and widely used by major search engines, while transactional queries were addressed only indirectly. Currently, under the third generation of search engines efforts were said to be mainly focused on combining data from multiple sources in order to answer the need behind the users query. Consequently, in the third generation, search engines should go beyond using a limited framework via semantic analysis, context determination and dynamic data base selection (Broder, 2002). In addition, the following argument has been used Spink, Jansen et al. (2002):

> "We need a new generation of Web searching tools based on a more thorough understanding of human information behaviours. Such tools would assist users with query construction and modification, spelling and analytical problems that limit their ability or willingness to persist in finding the information they need." (Spink, Jansen et al., 2002, page 109)

Furthermore, articles from business and IT experts like Hoover, the senior editor of the weekly printed magazine 'Information Week', reported that major search engines like Google, Microsoft and Yahoo are all racing to develop the next generation of search engine technologies in order to better assist web users with their search (Hoover, 2007, page 1):

> "With emerging tools, people will no longer have to dumb down their queries with the pidgin language understood by first-generation search engines. They'll be able to ask questions in English and other languages-- or pose no question at all and automatically receive results based on their earlier queries or the applications they're using." (Hoover, 2007, page 1)

Other examples of search engine designs include the Anomalous States of Knowledge framework (ASK), which was an early attempt on designing and implementing a retrieval system, personalised for the informational need of users. Under this framework, the requirements of the user were matched to the following five different classes of information: (1) Well-defined topic and problem, (2) Specific topics, (3) Topics quite specific, (4) Topics fairly specific and (5) Topics and problems not well defined. However, the study was not very successful as a number of problems were identified by the researchers regarding the implementation of their system, especially in translating the need of the users into system codes. It

was however concluded that an ASK-based IR system is at least feasible (Belkin, Oddy et al., 1982, page 161).

Considering this background information, a number of studies have also examined how web users adopt search tactics and strategies to locate and retrieve their required online resources. For example, Hoelscher (1998) analysed 16 million queries processed by Fireball (www.fireball.de), a German Web IR (information retrieval system) during July 1998, using semi-structured interviews and observation techniques. The aim of this study was to investigate how experienced web users ('Internet experts') "[…] manage to use the Internet effectively for their information needs and, more specifically, what knowledge structures and strategies do they use?" (Hoelscher, 1998, page 1212). In this study 'Internet experts' were described as those web users who have the knowledge and skills to use the Web and other Internet resources successfully in order to answer their search query; solve their information problems (Hoelscher, 1998, page 1212).

However, as was explained by Jansen and Pooch (2001, page 237), the findings from this study lacked detailed information and in-depth analysis of such that:

> "[…] no information was provided concerning user sessions, and there was limited discussion of query terms […] Also the Fireball search engine provided the summary statistics, not the raw data, to the researcher, making the particulars of how the transactions were logged and analyzed unknown [thus] […] is a serious shortcoming given the rapidly changing environment of the Web." (Jansen & Pooch, 2001, page 237)

In addition, Silverstein, Henzinger et al. (1999) have analysed around one billion queries from the AltaVista search engine and in support of previous findings they concluded that "[…] web users' web queries differ significantly from that assumed in the standard information retrieval literature": there is an increasing use of short queries in web searching, explaining that traditional techniques are no longer adequate for retrieving web search queries (Silverstein, Henzinger et al., 1999, page 6).

Moreover, Spink and colleagues (2002) conducted extensive research on the Excite search engine looking at users' search behaviour, analysing more than one million

queries over a period of four year. The study concluded that users were increasingly viewing only the first couple of pages of their search results and that their general searching habits did not change considerably over the period four years. Indeed, it has been reported that query lengths were simple in structure with few users incorporating advanced search features to their queries (Spink, Jansen et al., 2002, page 109).

Similarly, Eastman and Jansen (2003) examined one hundred advanced queries from the transaction log of a web search service that contained query operators such as AND, OR, MUST APPEAR (+), or PHRASE (" "). In their study, advanced operators were removed from queries and sent to Google, AOL and MSN search engines; a total of 600 queries were submitted and 5,748 documents were evaluated, in order to compare the coverage (total number of documents found), relative precision (relevant documents found), and ranking (relevant items found at the top of the list) of relevant documents (Eastman & Jansen, 2003, page 383).

The study concluded that the use of most query operators had no significant effect on coverage, relative precision, or ranking of the search results. Moreover, in this study the choice of search engine and use of operators did not have an impact on the relevancy of research results. This has been reported by the authors as following:

> "It appears that there is little advantage to using OR in a query, but there may be an advantage, at least in some cases, in using the PHRASE operator. A difference in ranking might be expected to make some difference to the user since it is more convenient to have relevant items at the top of the list. However, this study found only spotty improvements to ranking with no general improvement using any operator." (Eastman & Jansen, 2003, page 400)

Additionally, the searching behaviour of the European web users using a European search engine called AlltheWeb.com was examined by Jansen and Spink (2005). The searching characteristics, the number of documents viewed, the length of time spent viewing documents and the topical relevancy or usefulness of the searched documents were also studied and two datasets were collected from the AlltheWeb.com.

The first set of data was collected on the 6th of February 2001 and the second set was on the 28th of May 2002. Each dataset contained approximately one million queries, submitted by over 200,000 users, during a 24 hour period. Results from this comparative study showed that the query lengths and sessions of the users are short with little or no use of Boolean operators. Moreover, half of the web documents viewed (documents selected by the web user) were found to be topically relevant. Based on this finding, it was concluded that further research on the web searching strategy of the users is required. This included the comparison between the US and European users of the web search engines (Jansen & Spink, 2005, page 378).

Datasets from nine major web studies were also compared from 1997 to 2002 in order to check their external validity amongst web and search engine users in general (Jansen & Spink, 2006). Four of these studies were on European search engines called 'Fireball' (German), 'BWIE' (Spanish) and 'AlltheWeb.com' (Norwegian), while the other five were US-based search engines including 'Excite' and 'AltaVista'. In this study four research questions were addressed (Jansen & Spink, 2006, page 252):

(1) What are the trends and differences in the number of one-query sessions?
(2) What are the trends and differences in the number of one-term queries?
(3) What are the trends and differences in the number of result pages viewed?
(4) What are the trends and differences in search topics?

Findings from their study showed that session lengths and query lengths are not increasing (Jansen and Spink, 2006, page 259).

> "The percentage of one-term sessions is remaining stable over time and across web search engines […] The percentage of single-term queries is holding steady, and the use of query operators is also remaining stable."

However, the use of query operators by web users varied significantly among different search engines and therefore these findings could not be considered for the external validity in predicting behaviours of other search engines. Moreover, the tendency to view only the first page of search results increased over time and web searching topics were found to have changed; people were using the Web as a tool for variety of information tasks (Jansen & Spink, 2006, page 260).

Finally, Madden (2007) investigated search behaviours of the 'general public', in Sheffield; observing 39 searches performed by 9 volunteers aged 28 to 77 years old. In this study, volunteers were asked to perform self-selected tasks and pre-defined search tasks, set by researchers. Moreover, volunteers' search sessions were captured and recorded using software called 'My Screen Recorder'. Findings from this study showed that searchers who entered few search keywords and reviewed their returned search results were more successful at finding relevant and or useful information than those who tried to narrow down their search result by entering long series of terms, which also highlighted the importance of understanding users' web searching practices:

> "[…] it is clear from the findings of this study to date that, while search engines have an important role to play in information seeking on the Internet, often, the major part of a search takes place elsewhere." (Madden, Eaglestone et al., 2007, page 11)

The online searching behaviours of users were further investigated by Madden and colleagues (unpublished work), who compared observational data from more than 100 people composed of the 'general public' in Sheffield against transaction logs that had been described in other studies like Spink, Jansen et al. (2002). They argued that investigating users' web searching behaviours should go beyond student samples in Universities (search practices of undergraduate or graduate students), which are convenient to the researcher (Madden, Eaglestone et al., unpublished work).

In the observation made by Madden, Eaglestone et al. (unpublished work), volunteers were asked to carry out 'self-selected tasks' by recalling and repeating one of their previous unsuccessful online searches as well as performing two or more pre-prepared search exercises. Search exercises were distributed to users based on their individual web and search engine experiences. This information was initially obtained from participants using a university monitoring form. The completion or duration of each exercise for each individual participant was determined by the identification of their useful online information or by their search termination decision. Therefore, a completed task was either when a volunteer felt that a satisfactory answer was obtained, or when the subject wished to stop searching.

From this study, the reasons for selecting a particular search engine by the users were identified (Madden, Eaglestone et al., unpublished work):

1. "Size.
2. Aesthetics (e.g., users like the search engine's look).
3. Error (e.g., users use a search box that is specific to a particular web site thinking that they are searching the Web).
4. Familiarity.
5. Functionality (e.g., users feel that the search engine allows them to enter search terms in a way that suits them, or it presents the results of a search in a way that they find more manageable).
6. Recommendation by friend, relative, colleague or teacher."

As part of this study, users 'Query length', 'Session length', 'Boolean use and misuse', 'Number of pages studied', 'Link position' (i.e., first page), 'Success rates' and 'Semantic changes' were also analysed. Hence, results from this study showed that constructing search queries using Boolean operators (mainly quotation marks) appeared to be a difficult task to perform and that finding relevant online resources should not necessary involve using long query terms or Boolean operators (Madden, Eaglestone et al., unpublished work).

Therefore given the above information on the web searching needs of users, research findings on the searching problems of the web user will be discussed in the next section.

3.3.2 Research on the web searching problems of users

A number of other studies have also examined common problems faced by users when searching the Web. For example, research suggests that most users are not prepared to spend time learning about extra functionality. It has been found that less than one percent of the public use any of the advanced features offered by many search engines (Steinberg, 2004). Additionally, when faced with unsuccessful searches, 49% of users would often switch search query and or search engine after reviewing the first page of their search results (iProspect, 2008, page 16), suggesting that the increasing use of advanced search features would predominantly depend on their benefits offered to the web user with reference to their individual needs and preferences.

Furthermore, the frequent interaction of users with search engines have resulted in experiencing many problems with their online searching such as *ambiguity* in their query terms and finding *irrelevant* search results. Ambiguity of query terms arises as generic search engines such as Google and Yahoo require its online users to express their searching needs (query) using search keywords (Ayers, 2005; Speretta & Gauch, 2004). And as Kaushik (2007, page 4) described:

> "At present, most of the search engines work on the basis of the exact matches of the keywords entered for search. This can be confusing as a single word can have different meanings. In future, search engines will be developed on the basis of concept-based searching and natural language queries, and this phase of evolution in search engines has been keenly awaited by users around the world." (Kaushik, 2007, page 4)

The filtering difficulties of web users in their search results also occur as the relevancy of search results or links are often determined by the number of times it has been visited and referred to by other web sites (Nunberg, 2003). Therefore such results are not necessarily determined by the individual needs and preferences of the users; results are ordered by web site popularity rather than web users interests (Speretta & Gauch, 2004).

Therefore, given the above findings, it can be said that search engine developers are required to re-focus their time and effort on the 'query construction' of the users and the 'quality' of search results that they receive, in order to tackle the individual/human issues of users and their web searching barriers (Jansen & Spink, 2005; McLaughlin, 2005; Spink, Jansen et al., 2002). The success of achieving this level of user satisfaction is also dependent on the management and organization of the web page (Asadi & Jamali, 2004; Jansen & Spink, 2005). This requirement is further highlighted by Olsen (2005, page 2) as following:

> "With books, scholarly papers and television programs being digitized and put online, the technology necessary to search through the material needs to be that much better. People need a way to trust the information they find and to ask more-complex questions with search tools so they can extract knowledge or ideas."

Since existing retrieval systems are not fully adaptable to individual web users, developers need to understand the searching needs and preferences of users

(Nunberg, 2003; Sugiyama, Hatano & Yoshikawa, 2004; Teevan, Dumais & Horvitz, 2005).

Finally, developments in search engine technology have resulted in a number of studies on the searching needs of the web users as well as their problems and usage of educational search engines. These related studies on educational search engines will be discussed in the following section of this review.

3.4 Research on the practical use of educational search engines

The purpose of this section is to review empirical evidence about search engines in Education. However, *when searching the literature only a handful of studies* were found in this area. Hence, four examples of previous educational search engines including (1) 'Gateway to online Educational Materials', (2) 'Curriculum online', (3) 'Toolbox Digital Repository' and (4) 'SchoolNet' will be reviewed in this section to show the range of issues facing teachers when searching online.

In the US, there is an educational search engine called the Gateway to online Educational Materials (GEM). The aim of this web site is to improve the ability of the educators to access online information such as lesson plans and curriculum units for their classroom teaching (Fitzgerald, 2003, page 2). This search engine is defined as the "one-stop, any-stop access to high quality lesson plans, curriculum units and other education resources on the Internet" (Fitzgerald, 2003, page 8). Therefore this search engine supports the assumption that teachers have inadequate time to plan and integrate technology into their teaching, while high-quality and poor-quality educational materials can both be found on the Internet, and these can be sifted out through the application of quality criteria (Fitzgerald, 2003).

With this web site, teachers can search for teaching materials such as 'lesson plans', 'educational web pages', 'books for sale' and also resources available via national museums. Teachers could use keywords such as 'subject' or 'grade level' to refine their search results. Educational materials entered into the Gateway are described using metadata 'title', 'description', 'grade level', 'GEM subject headings', 'date', 'language', 'publisher', 'creator', and 'cataloguing agency'. Furthermore, the quality or

usefulness of a material is determined by the following six criteria (Fitzgerald, 2003, page 3-4):

1. Accuracy: information presented is reliable, valid, and authoritative, impartially presented, and current. Biased resources should be avoided.

2. Appropriateness: vocabulary and concepts should be appropriate for the intended learners' level. Information and procedures should be relevant to the topic. Extraneous [irrelevant] data, overly advanced vocabulary and concepts, and irrelevant activities are not appropriate.

3. Clarity of objectives, methods, procedures, and assessments: there should be a clear tie between the purpose (goals and objectives) and the content and procedures suggested. This correlation should be comprehensive and obvious. Redundancy is usually unwelcomed and isolated activates without a relationship to objectives are superfluous.

4. Completeness: resources should provide full coverage of essential, current information, as well as include such components as self-contained activities, lists of materials required, prerequisites, information for obtaining related resources, assessment criteria, links to quality indicators, and standards. Logical concept development should be evident and content should be comprehensively covered.

5. Motivation: activities should encourage active engagement of the learner. Desirable activities are challenging, interesting and appealing. They build on prior knowledge and skills, and emphasize and promote relevant action on the part of the learner. Activities with potential for developing confidence and satisfaction as a result of learner effort are desirable.

6. Organization: the resources should reflect logical development and clear actions to be taken by both teacher and learner. It should be easy to use and logically sequenced, with each segment of the resource related to other segments. It should flow in an orderly manner, using organizing tools, such as headings, and avoid use of unrelated elements that are potentially ineffective or overpowering.

Accordingly, the GEM web site (system) was evaluated over a four year period using online questionnaire surveys, focus groups and expert reviews among teachers (end users), content designers and/developers. However, despite four years of continuous assessment and improvement of the GEM search engine, problems such as teachers' lack of experience/skills and indeed their individual preferences for online searching, were all reported to be unresolved. Moreover, in the Gateways' final evaluation report (year 4) it was stated that teachers' failure to limit their search results to lesson plans only was a cataloguing and search interface issue, which was a great

disappointment to teachers (Fitzgerald, 2003, page 22). Teachers in the GEM study found it difficult to search the Gateway repository using Boolean operators and indeed to understand the controlled vocabularies (Metadata) adopted by the GEM search engine, which were commonly used by experienced searchers such as the librarians and computer programmers:

> "We observed first hand that they [teachers] did not understand Boolean logic functioning and phrases commonly used by librarians such as 'full text', 'full record', or 'browse'." (Fitzgerald, 2003, page 23)

Moreover, when compared to generic search engines like Google, the Gateway search engine was said to lack simplicity by the teachers:

> "While it seems unlikely that the limited resources behind *The Gateway* can ever imitate the Google phenomenon, we must acknowledge and accept that users are increasingly expecting the power and simplicity of *Google* in many searching situations. Where choices are to be made between increasing complexity versus clean simplicity, it would seem that users continue to prefer the simple route. Both focus groups expressed a desire for simplicity, which is perhaps the real meaning for their liking for *Google*." (Fitzgerald, 2003, p. 23)

Thus, a number of recommendations were made by Fitzgerald (2006, page 27) in order to further improve the GEM search engine. For example, it was recommended to simplify the interface design/layout of the GEM search engine, to include a 'starter' page to the web site and to evaluate the cataloguing vocabularies currently used to describe resources.

Other search engines that processes users' search queries; provides learner's and or educator's with learning resources, using metadata includes the 'ARIADNE Knowledge Pool System' (www.ariadne-eu.org), the National Science, Mathematics, Engineering, and Technology Education Digital Library (www.smete.org), Multimedia Educational Resources for Learning and Online Teaching (www.merlot.org), the Health Education Assets Library (www.healcentral.org), the Education Network Australia (www.edna.edu.au), the iLumina (www.ilumina-dlib.org), the LearnAlberta Online Curriculum Repository (www.learnalberta.ca), CAREO: Campus Alberta Repository of Educational Objects (www.ucalgary.ca/commons/careo) and the LydiaLearn (www.lydialearn.com),

(Neven, Duval et al., 2003; Roy, Sarkar et al., 2010; Sampson & Karampiperis, 2006, page 131).

The summary of the different available learning object repositories together with their searching and browsing facilities in different subject domains like Science, Mathematics, Language and Music is given by Roy, Sarkar et al. (2010). Their comparisons of learning object repositories, searching and browsing facilities in different subject domains are presented in tables 2 and 3.

Learning Object Repository	Features		
	Meta-data Standard	Metadata annotation	Document Repository
ARIADNE	IEEE LOM	Manual and Automatic Metadata Generation	Links
SMETE	IEEE LOM	Manual	Links
MERLOT	IEEE LOM	Manual	Links
HEAL	IEEE LOM	Manual	Links
EdnA	Dublin Core profile	Manual	Links
iLumina	IEEE LOM	Manual	Document Repository
Learn-Alberta	IEEE LOM	Manual	Document Repository + Links
CAREO	IEEE LOM	Manual	Document Repository
Lydia	IEEE LOM Profile (SCROM)	Manual	Document Repository

Table 2 Comparison of learning object repositories based on the metadata standards used for annotating learning materials, taken from Roy, Sarkar et al. (2010, page 111).

LOR	Facilities			
	Simple Search	Advanced Search	Browsing	Subject Domain
ARIADNE	Keyword search	Document title ,Usage right,Author's name, Main Concept	No	Science
SMETE	Keyword search	Keyword, Learning resource type ,Grade, Title, Author, Collection, Publication year	Browse by discipline	Science, Mathematics, Engineering, Technology
MERLOT	Keyword search	Subject, Subcategory, Material type , URL, Description, Primary Audience, Technical format, Language, Author's name	Browse by discipline	Science, Engineering, Business, Justice, Music, Health Science
HEAL	Keyword search	Learning resource type, Title, Description, Contributors, Medical subject heading term	Browse by Medical subject heading or by collection	Health Science
EdnA	Keyword search	Adult & community education, Vocational education & training, General references, Higher education, Educational organizations, School education	Browse by discipline	Education
iLumina	Keyword, Subject, Author, Journal title, ISBN/ ISSN number	Type of material, Year, Language	Browse by discipline, subject, topic	Science, Mathematics, Engineering & Technology
Learn-Alberta	Keyword search	N/A	Browse by grades	Mathematics, physical Education, Science, Social Studies, Language, Fine Arts, CTS, CALM
CAREO	Keyword search	Title, Description, Keyword, Discipline, Technical format, Learning resource type, Intended user role	Browse by discipline	Science, Engineering, Business, Justice, Music, Health Science

Table 3 Comparison based on the searching and browsing facilities in different subject domains provided by the Learning Object Repositories, taken from Roy, Sarkar et al. (2010, page 112).

Other issues relating to the design of content models, content re-usability, context-aware recommendation and or personalisation have been discussed by authors such as Xavier Ochoa, Erik Duval, Gonzalo Para, Joris Klerkx and Katrien Verbert, which are outside the scope of this research.

Furthermore, in the UK the *Curriculum online web site* was launched in January 2003, as part of the government's initiations to improve standards in schools. Hence, the aim of this web site was to provide "[…] access to a wide range of digital materials to support teaching and learning across the curriculum" (Kitchen, Dixon et al., 2006, page 7). With this new portal, teachers across the UK were able to search accredited suppliers for their required/preferred online teaching resources (digital resources). Using this new portal, selected teachers were able to purchase their required resource/s using their schools' 'eLearning Credits' (eLCs), funded by the government:

> "The first tranche of funding was released in the autumn of 2002, and £100 million was provided in each of the academic years between 2003 and 2006." (Kitchen, Dixon et al., 2006, page 7)

This web site was evaluated each year through a series of school questionnaire and interview surveys amongst primary and secondary teachers in England. Initially, the evaluation of the portal showed that teachers do support this new development but was unsatisfied with their search features. Teachers found their search (results) to be 'irrelevant', 'unsorted' and 'time consuming'. Moreover, the search results were not adequately improved by the advanced search options ('refine search') and were considered to be too complex for some teachers to use. Suppliers were also reported to have concerns about the way in which their product was marketed to teachers and were said to find registration and tagging of products difficult to perform:

> "Fewer than half of suppliers stated that they found the mechanism for metatagging or uploading metadata, or the conditions and mechanisms to get products accredited, easy to understand. Nearly half (47%) of suppliers were concerned about equality of exposure of products on the web site." (Kitchen, Dixon et al., 2006, page 12)

Consequently, the curriculum online web site was re-launched in December 2003, which led to improving the web site appearance and clarity together with developing a standard system for promoting the products of the suppliers. As a result, findings from this study showed that in 2005, the use of digital materials by teachers for their lesson planning were increased in comparison to 2002 (Kitchen, Dixon et al., 2006).

> "Some teachers recognised that the use of digital sources for lesson planning could lead to savings in time, commenting that over time it would be possible to build up a bank of easily adaptable ICT-based resources and this would eventually free up time for teaching. Teachers also described how some ICT tools could shortcut activities such as searching the internet for information and pictures or creating exercises." (Kitchen, Dixon et al. , 2006, page 18)

Thus, teachers were seen to have developed a more positive attitude towards using digital resources in their lesson plans:

> "Digital sources were used on average for 15% of primary subject leaders' lesson planning in 2002, and this increased to 32% in 2005. Among secondary subject leaders, the average proportion of planning using digital sources rose from 15% to 25%." (Kitchen, Dixon et al., 2006, page 18)

However, despite the re-launch of the curriculum online web site, teachers were still faced with a number of technical problems. In their final evaluation of the curriculum online, mismatches were observed between individual teachers' search queries

(search criteria) and their returned search results. Equally, concerns were raised about the lack of granularity and abuse of meta-tagging by some suppliers (Kitchen, Dixon et al., 2006, page 14).

In Australia, there is the 'Toolbox Digital Repository' project (http://toolboxes.flexiblelearning.net.au) that was undertaken in 2002 as part of the Flexible Learning Toolbox project which involved the design and development of a digital library to support the retrieval, access and reuse of online teaching materials (learning objects).

In this project, content developers were required to define their resources using fifteen descriptors adopted from the EdNA (Education Network Australia) metadata set; a metadata version that was consistent with the Australian Government Locator Service (AGLS). The toolbox was further described by Crisp, Thiele et al. (2003, page 77-78) in the following quotation:

> "When keywords are entered into the search engine, a page (or series of pages) is produced with links to the various resources that match the keyword search. […] Selected items are added to a *collection* with the user able to add (and remove) items until all required items have been sourced. […] on command from the user the system creates a zip file comprising the pages selected and the resources (e.g., images, graphics) displayed on each page, and allows the user to download this file to the user to facilitate reuse of the items in the user's setting."

Finally, the design and usefulness of the toolbox was evaluated through series of 'test and trials' from which a number of recommendations were made. This included supporting the re-usability of digital resources by encouraging content developers to use accurate and reliable metadata (Crisp, Thiele et al., 2003).

In Canada, an educational portal called 'SchoolNet' was initially developed in 1993 to support teachers' online searching needs. An evaluation of the educational portal was conducted by KPMG (KPMG Consulting LP, 2000) through email questionnaires, interviews and six case studies to learn about teachers' online searching practices and needs; emails were sent to 3,000 web users from which only 216 replied.

In this study issues relating to SchoolNet's users' lack of ICT training was raised (KPMG, 2000, page 76). Moreover, in their final evaluation (report) of the portal, four conclusions and eight recommendations were made. Constant monitoring and adaptation of new/improved computers and Internet technologies was called for and the need for the SchoolNet (an educational portal) to identify and tackle other related ICT barriers was highlighted:

> "[…] there is a wide variety of barriers to effective ICT use that will be important in the near future, including technical issues related to high-speed access to the Internet, lack of ICT technical support, and so on. SchoolNet is considered to have a moderately important future role in addressing virtually all of them." (KPMG, 2000, page 76-77)

Other examples of academic institutions or educational search engines include 'UREKA' and 'DigLib-CI'. UREKA is a learning object taxonomy and repository architecture (ULTRA) that aimed at personalising the creation (storage and retrieval) of learning objects as well as increasing the usability of learning objects among teachers, departments or universities by means of dividing the learning object into (1) a Semantically Meaningful Unit (SMU) metadata based on the IEEE LOM standards stored in an XML file "[…] using Profiling that plays a vital role by storing Basic and Domain Profile of the user" and, (2) a Common Media Framework (CMF); integrating relevant SMU's using Synchronized Multimedia Integration Language (SMIL) (Ihsan, Rehman et al., 2006, page 231).

Furthermore, DigLib-CI, an on-going project, is a digital library with research and learning materials such as articles, lecture notes, textbooks, quizzes and manuals created at the department of Computer Informatics, Faculty of Mathematics and Informatics (FMI), Sofia University. In this project a set of subject ontologies is investigated in order to provide 'flexible, semantics-oriented access' to the library resources according to their users' profile and language skills (Nisheva-Pavlova & Pavlov, 2010).

> "The complete implementation of the project will help to enhance the research activities and the exchange of teaching innovation and thus will improve the overall scholarly and teaching quality in Computer Science and Information Systems at FMI. It will also contribute to the methodology of development of innovative software systems maintaining the entire lifecycle of academic digital content." (Nisheva-Pavlova & Pavlov, 2010, page 55)

However, access to online learning objects is still difficult despite the availability of quality learning objects and their organization that is continuous tagging and sharing of online learning resources around the world (GLOBE, 2011) by 'publishers', 'consumers' and manipulators. Third parties who use metadata to provide 'information services' to online users (i.e., search engines or web portals), consider reusing and tagging of learning objects to be time consuming and thus a consider this method difficult task to achieve (Ahmed, Pathmeswaran et al., 2007; Neven, Duval et al., 2003; Nisheva-Pavlova & Pavlov, 2010).

Indeed issues relating to metadata (tagging of leaning objects either manually or automatically), retrieval and re-usability of learning objects (including web personalisation) have been investigated by many researchers. For example, in Ford's (2008) annual review of Information Science and Technology, research studies and issues related to interoperability and sharing of online resources, use of metadata and adaptive systems for personalising users' resource discovery were discussed.

Additionally, Roy, Sarkar and Ghose (2010), described social and cultural barriers and challenges of developing shareable learning objects by way of surveying academic staff members (fifteen staff at the School of the Built Environment, University of Salford) from which a conceptual framework for improving the technology was designed and developed; Liu and Belkin (2011) proposed a model for personalising users' search results according to their search goal and search behaviour in order to improve web users' returned search results by means of predicting relevant and or useful documents; and Rekha, Nirase et al. (2011) proposed a model for personalising online search engines (improving information retrieval systems) using a combination of 'usage mining' and 'content mining' technique to offer its users with potentially useful online learning objects or information.

Therefore, while issues relating to the content management, delivery and organisation of online resources is closely relevant to the research problem proposed in this thesis (section 3.6) they will not be further discussed nor used in this thesis as the focus of this research is mainly on users' search options and features at the

interface design (presentation level) and *not* at the organisation (search engines' system architecture) or content level (creation and delivery of learning object).

With this background information in mind, the following section of this chapter will discuss web 'personalisation' within the context of the UK educational setting in order to tackle ICT barriers when searching online for teaching resources.

3.5 Personalisation of ICT–use and its outcome in education

One of the themes that are emerging from the literature is the concept of web 'personalisation'. Today, the government and technologists, flag web personalisation as the way forward in enhancing search engine performances and indeed achieving web users' satisfaction. This has been reported by Heppell (2008) and Wirken (2011):

> "In the 21st century technology empowers and democratises […] [and] As a world of one size fits all gives way to a world of personalisation, education will need to follow to survive." (Heppell, 2008, page 29)

> "The concept of personalisation is one of the next big frontiers in the story of search, primarily because this is the one thing that might provide the most significant step towards quest for the perfect search engine - one that gives us exactly what the users are looking for." (Wirken, 2006, pages 2-3)

This means that since new techniques and search algorithms have emerged, users can receive different sets of search results reflecting on their individual preferences and interests. Currently there is no standard definition on what the term 'personalisation' means (Fuller, 2002, n.p). For example, Wu, Im et al. (2003, page 2) defines web personalisation as:

> "[…] the adjustment and modification of all aspects of a website that are displayed to a user in order to match that users needs and wants. This includes modifications to the content that is displayed to the user, adaptations of the display itself and of the user's passage through the display, that is the set of links the user might take. What we do not perceive as personalization is the update or modification of a web site that occurs to all users, e.g., the presentation of a travel flayer announcing a special cruise deal. In addition, if a user indicates in a check box that they do not wish to receive email advertisements from a website, we do not perceive this as personalization. Thus, although our definition is broad-based, it clearly focuses on adaptations that are exclusively for the individual user."

And according to (DfES, 2004, page 4) personalisation is:

> "[…] about putting citizens at the heart of public services and enabling them to have a say in the design and improvement of the organisations that serve them. In education this can be understood as personalised learning – the drive to tailor education to individual need, interest and aptitude so as to fulfil every young person's potential."

However, despite having no common definition, in the DfES's (2006), *Teaching and Learning 2020 Review*, 'personalisation' was identified as a key educational priority for UK's schools. In this review it was explained that the education system (schools) needs to respond to the challenges of the 21st century, for example by having:

> "[…] far greater access to, and reliance on, technology as a means of conducting daily interactions and transactions [and indeed] […] a knowledge-based economy where it will be possible to compete with developing and global markets only by offering products and services of high quality, matched closely to customers' [users i.e., teachers'] needs." (DfES, 2006, page 8)

Additionally, Sunikka and Bragge (2008, page 4) reviewed 1200 articles that contained the word "personalisation" from two scientific journals called "ISI Web of Science" (WOS) and "ABI Inform ProQuest Direct" (ProQuest), during 1986 to 2006. Findings from this review showed increasing rise in personalisation studies that are carried out in various disciplines particularly information systems (IS), computer science and marketing. Moreover, in this study, the definition of personalisation was said to be unclear and anticipated that a common understanding of personalisation will emerge in the future. Accordingly, the authors called for further studies on personalisation from the perspective of users (Sunikka & Bragge, 2008, page 9):

> "Further studies on personalization are needed; especially in the areas of consumers' views on benefits and drawbacks of personalization, as well as the true effectiveness and efficiency of personalization."

In this thesis the term personalisation is defined as "[…] the process of presenting the right information to the right user at the right moment" (Speretta & Gauch, 2004). Therefore, with personalisation we are moving away from 'consensus relevancy' or generalization to 'personal relevancy' or specification. This means that the computed

relevancy for the entire population is replaced with the needs and preferences of individuals within the context of their interactions (Pitkow, Schutze et al., 2002, page 50).

Furthermore, research on the personalisation of education search engines include that reported by Wishart and Oades (2003), who performed a four month research, investigating the needs and preferences of different web user groups when using educational web search engines. This study was conducted amongst 27 educators (25 teachers and 2 teaching assistants) and 24 non-educators (librarians, adult learners and parents/governors), using online questionnaires, two computer based tasks and focus groups. Of the 51 participants, 38 were from the East Midlands and 13 were from other regions in the UK (Wishart & Oades, 2003).

As part of this investigation, users' reaction to personalised features was surveyed, which included bookmarks and personally tailored web sites together with personalised email alerts and newsletters. In their conclusion, the following users' needs and characteristics when using educational portals were identified (Wishart & Oades, 2003):

- They [participants] wish to be certain of the quality of information they find and use.
- They experience many demands on their time. They have a strong requirement to be able to find the information they need easily, quickly and without having to think too hard about how they might approach the task. They want to be able to use a website intuitively.
- They prefer web pages that fit onto a screen without requiring them to scroll to view the entire page.
- They like a simple, clear site design, with less textual information and more icons on the page. This was a particularly evident characteristic of educators.
- Their information needs are complex. They want to be kept up to date but fear information overload; they are anxious that they don't miss any new developments but want to receive information that is relevant to them. Additionally, they are aware that achieving a perfect match to their requirements would be difficult and are uncertain about whether personalisation can be achieved.

- Teachers have a clear requirement from the web for subject specific teaching resources.

- They require the benefits of personalization features to be clearly communicated on a website. Additionally, they want ready access to simple and comprehensive instructions. Without these, it is unlikely that they will register.

- They expect a personal page to make them feel welcome and valued. They would like to be recognised by a greeting that uses their first name and for this greeting to be prominently displayed on the page.

- Educators often teach low performing cohorts. They also teach cohorts of mixed ages. Others teach children with special needs. In each of these instances, they experience great difficulty in retrieving useful information.

Also, in a small scale but relevant study (Henry, 2005), the searching needs and practices of teachers were investigated by using the following three research questions: (1) How do teachers learn to access information on the Internet? (2) How do teachers conduct what they consider to be successful searches? and (3) What literacy skills do teachers believe are necessary to the process of conducting searches on the Internet?

This study was carried out in a rural school in North-eastern Connecticut (USA), amongst six middle school teachers using mainly interviews and observations from which the following six themes were identified (Henry, 2005):

1. *'Literacy skills* – reading and writing on the web.

2. '*Other skills and strategies*' – critical thinking, Judgment and Common sense, and Logic and Problem Solving.

3. '*Learning technology*' – For example, all the teachers said they have learned how to search the Internet by using 'a trial and error approach', 'being self-taught' or 'a combination of attending workshops followed by self-exploration'.

4. *''Emotional reaction to technology'* – all teachers were reported to have an 'emotional reaction or connection' to using technology in general. In this study, only one teacher had a positive emotional connection with technology (considered herself as a "computer geek") while the other teachers reported to have negative emotional reactions that included 'fear', 'stupidity' and 'panic'. Additionally, a number of teachers were also reported to have experienced frustration when using ICT tools in their classrooms. This included problems with accessing the Internet and the school's server equipment.

5. '*Issues of digital divide*' – that is students having different access levels at home and or school and levels of ICT skill which can make it difficult for teachers to incorporate technology into their classroom; and

6. *''Technology in the Classroom' – that is perceiving technology as an important tool and or resource for teachers to meet their students' learning needs in the classroom.*

Finally, the author concluded that apart from issues relating to 'literacy' and 'problem solving' skills, there are also other technological and access barriers that need to be further investigated:

> "[…] searching and locating information on the Internet requires not only literacy skills but problem solving skills as well. Additionally, there are other issues to be considered such as levels of technology attainment, teachers' comfort with using technology, and equal access for students." (Henry, 2005)

In conclusion, studies in the field of web personalisation is concerned to be an important factor in the 21st century education and that researchers have already begin investigating issues relating to the searching needs and practices of teachers, with not a great deal of work carried out on making web searching easier for teachers at a *technical level* to use in their teaching.

3.6 Summary

This chapter discussed the idea that education needs to be personalised by teachers according to their individual students' learning requirements and preferences. Currently despite the advances in web (Web 2.0) and search engine technologies, teachers in particular, are also still faced with a number of *technical level* barriers, when searching online for teaching resources.

This chapter also highlighted that there is not a great deal of work carried out on making the search engines, in particular web searching easier for teachers at a *technical level* to use in their teaching. Finally, 'personalisation' was outlined as a proposed solution to the many barriers faced by web users in general and educators in particular, when searching the World Wide Web. Therefore, to *make web searching and finding online resources easier for UK teachers*, researchers are recommended to explore further research problems in the area of teachers' information needs and search behaviours. The requirement for online resources has

been outlined in the 'Harnessing Technology' strategy and 'ICT in Schools Policy'. Furthermore, studying the web search practices by teachers would also aid researchers to design and develop a model of teachers' web information needs and search behaviour relevant to educational software design. This can ultimately be used by search engine designers and or developers to better understand the web searching needs and preferences of teachers, when designing their search tools.

3.7 The research question

Therefore, given the above understandings it is the objective of this research to make web searching that is finding online resources easier for primary, secondary and post-compulsory teachers in the UK educational settings. In this research, individual teachers' web search behaviours and information needs will be investigated in order is to develop a model of teachers' information needs and search behaviour relevant to educational software design. However, teachers' other technical barriers that is the design, access and re-use of online teaching resources were not investigated in this thesis. For example, individual teachers' usage, storage, sharing, creating and or re-using of online resources in their classroom teaching and issues relating to metadata standards and annotations (Kitchen, Dixon et al., 2006), were considered to be outside scope of this research.

The research question proposed for this study is "*What options and features are required by teachers to personalise their search for online teaching resources?*" using the following two research sub-questions:

1) Which options and features do teachers use when searching online via the revised search tool?

2) What were the preferences of teachers in relation to personalised searching?

In this thesis, a *search option* is one which is chosen or selected by the teacher and a *search feature* is the characteristic and or quality of an option that a teacher experiences when using a particular option.

With this background information and research sub-questions in mind, the following chapter will describes the research design and methods adapted for carrying out this research. The research design and methodology that is samples used in this study, samples access, research ethics and data analysis will be outlined in chapter 4.

Chapter 4

Research design and methodology

This chapter describes the research designs and methodologies that were used in this thesis. This includes literature review of the different approaches that were considered and adopted for collecting and analysing information in this thesis.

4.1 Overview

In this thesis, a *case study* of the kind of search options and features individual teachers need and preferred to have when personalising their search for online teaching resources was investigated.

In this case study, a triangulated mixed methods approach was adopted in order to maximise data validity and reliability. Additionally, a sequence of evidence gathering called 'System Development Life Cycle' (SDLC) methodology was created to link findings obtained from different sources of data, iteratively. The System Development Life Cycle' (SDLC) methodology was adopted to (1) collect information about teachers required search options and features, (2) design and

develop a research prototypes (physical artefacts) for teachers to use, (3) asking teachers to evaluate the research prototypes and finally to (4) confirm researcher's findings and understandings with teachers at observations and interview sessions using research prototypes or search tools. The rational for selected research design and methodology is further discussed in section 4.3.

The methodology adopted in this case study can be described as one that is based on the idea of generating data from a teachers own view and drawing from the strengths and minimizing the weaknesses of both qualitative and quantitative approaches. Nevertheless, despite the attractive possibilities of using both quantitative and qualitative methods (iteratively) my method has encountered limitations, as the number of samples in each method is small (limited to 30 teachers), which lead to the loss of having the scale of large quantitative analyses, and the depth of purely qualitative analysis, in general.

Structure of the chapter

In this chapter, (1) the *five main research designs* are briefly reviewed, from which the Case Study design and Mixed Method Research was selected; (2) a *System Development Life Cycle (SDLC) methodology* was designed and implemented in order to maintain a sequence of evidence gathering; (3) the *research methods used in the case study* are defined that is the questionnaire designs, observation and interview surveys; (4) the *samples used in this study* are described followed by their means of access and the ethical considerations for this case study; and, finally, the *steps taken to analyse data* under 'bivariate' and 'content' analysis, are explained.

4.2 Research designs

In this study, case study (section 4.3) and a mixed method research approach (section 4.3.1) was adopted by the researcher to answer the research sub-questions. This decision was further to reviewing the five main research designs in social sciences as outlined by (Bryman and Bell, 2007): 'Experimental research design', 'Cross-sectional design', 'Longitudinal design', 'Comparative design' and 'Case study design'.

These research designs are described and reviewed in the following sections of this chapter in terms of their strengths, weaknesses and indeed suitability for the research carried out in this thesis.

4.2.1 Experimental research design

As described by Bernard (2000), experimental design is an effective method for understanding the occurrence of a phenomenon (the reason for an outcome) or otherwise referred to as the 'cause-and effect relationships'. This method is highly recommended in social sciences as results produced under this method have 'high internal validity', meaning,

> "[…] that changes in the dependent variables were [are] probably *caused by*– not merely related to or correlated with–the treatment. This is why the experimental method is considered so powerful." (Bernard, 2000, page 108)

The main advantages of the experimental research design is the 'strength' and 'reliability' of findings, as with experimental design researchers can have full control over their experiment, which makes the replication of a study much easier. With the experimental research design, researchers have the ability to detect the effect of an 'independent' variable or condition in a control setting; one variable is manipulated each time while all other 'dependent' variables are kept constant. Hence, in the experimental research design, researchers can choose to have 'true experiments'; this is when subjects e.g. teachers are randomly selected in 'quasi-experiments' (also known as 'natural experiments') where participates are systematically selected for a study. Experimental research designs can also be grouped according to their intended location or setting which is either in the 'laboratory' or out in the real world, also called 'field experiments' (Bernard, 2000).

On the other hand, running controlled research settings especially in laboratories can produce results with 'low external validity' as 'artificial' conditions are created for subjects to interact with, which may not fully mirror the real world situation. Moreover, the manipulation of independent variables/conditions is subject to their being practical and ethical (Bernard, 2000).

For example, we could run controlled research settings among school teachers in laboratories or indeed at their work environment to investigate existing search

practices of teachers that is looking at the kind of search options and features used by individual teachers when searching online for teaching resources, but this would not answer my research sub-questions.

4.2.2 Cross-sectional and longitudinal design

Cross-sectional designs are mostly associated with surveys aimed at measuring "[…] some variables at a single time", (Bernard, 2000, page 255). In surveys, samples are selected to represent the larger population. With this method, researchers are able to replicate previous studies as the same instrument that is questionnaire can be used.

> "A cross-sectional research design entails the collection of data on more than one case […] and at a single point in time in order to collect a body of quantitative or quantifiable data in connection with two or more variables […] which are then examined to detect patterns of association." (Bryman and Bell, 2007, page 55)

Cross-sectional research "[…] lacks the internal validity that one finds in most experimental research", as results from a one off survey would not be sufficient to make generalisation across the whole population, (Bryman and Bell, 2007, pages 56-58). Nevertheless, 'Multiple cross-sectional' surveys can be used in conjunction with the 'longitudinal design' to monitor changes in people's attitudes and behaviour over a period of time i.e. every year, week, day or even hour, (Bernard, 2000; Elliott and Holland et al., 2008).

Having said that, using multiple cross-sectional surveys could have 'reliability' problems given that samples from two or more surveys, that is findings from year 1 and year 2 could produce different results, thus making the analysis of data very difficult as researchers would not be able to,

> "[…] know if it's because people's attitudes or reported behaviors have changed, or the two samples are very different, or both." (Bernard, 2000, page 256)

Thus, to keep samples consistent researchers could adopt 'panel studies' (described below) to conduct multi cross-sectional surveys.

> "In a panel study, you interview the exact same people over again. Panel studies are like true experiments: Randomly selected participants are tracked for their exposure or lack of exposure to a series of interventions in the real world." (Bernard, 2000, page 256)

For example, a series of interviews and or questionnaires can be carried out amongst a set number of school teachers (a selected group of teachers), over a period of time to find out about the kind of search options and features that are used by teachers and indeed preferred to have when searching for online teaching resources.

However, panel studies too have their limitations (cohort studies share similar problems) as results could suffer from respondents' withdrawal or otherwise referred to as "respondent mortality" (Bernard, 2000, page 257).

> "Each time individuals in a sample are re-contacted there is the risk that some will refuse to remain in the study, some will be untraceable, and some may have emigrated or died." (Elliott and Holland et al., 2008, page 235)

In this thesis, teachers are more likely to withdraw from a study due to change of location, change of profession or simply unavailable because of family or health related problems thus making the analysis of survey results very difficult.

> "[…] if this happens [people drop out], and the results of successive waves are very different, you can't tell if that's because of (1) the special character of the drop-out population [i.e. teachers], (2) real changes in the variables you're studying [i.e. search engines], or (3) both." (Bernard, 2000, page 257)

Moreover, adopting panel studies in this thesis would not be feasible as the researcher will have restricted research time, limited resources, funding and access to schools.

4.2.3 Comparative design

Comparative research design (non-experimental studies) shares the same features as cross-sectional design (discussed earlier in this section), as the researcher,

> "[…] can make direct comparisons across cases and look for generalization." (Bernard, 2000, page 386)

With this method researchers are also required to identify an independent variable for their studies while keeping all the other dependent variables constant.

> "In terms of issues of reliability, validity [internal validity is typically week], replicability and generalizability, the comparative study is no different from the cross-sectional design. The comparative design is essentially two or more cross-sectional studies carried out at more or less the same point in time." (Bryman and Bell, 2007, page 68)

Indeed, if the objective of this research was to investigate teachers' online searching practices and preferences at different educational levels they worked in, such as primary and secondary schools, then comparative design would have been useful. In this study, the researcher could have made a particular search engine like Google and its personalised search features as the independent variable and teaching levels as the dependent variable, in the study.

However, in this thesis, a comparative design would not be a practical option to choose, since the study intended for this research is very much descriptive (or explanatory) rather than a causal (or exploratory) study. And, as was explained by Bernard (2000, page 139),

> "Some designs are more effective than others, but it is not possible to use the most effective designs in all situations."

With this review information in mind, the following section of this chapter will describe the strengths, weaknesses and suitability of using case study design, within the context of the research carried out in this thesis.

4.2.4 Case study design

The case study design is another 'non-experimental' and 'descriptive' type of research design that is used by researchers in different settings to learn about,

> "[…] individual, group, organizational, social, political, and related phenomena." (Yin, 2003, page 1)

Case studies are also useful when researchers cannot carry out experimental studies due to practical or ethical reasons. The strengths and weaknesses of using case study was outlined by Wellington and Szczerbinski (2007, page 94), in the following table.

STRENGTHS **Case study should be...**	**WEAKNESSES** **Case study many not be…**
Illustrative	Generalizable
illuminating/insightful	representative
disseminable, accessible	typical
attention-holding	Replicable
strong on reality, vivid of value in teaching	repeatable

Table 4 Case Studies: Strengths and Weaknesses, taken from Wellington and Szczerbinski (2007, page 94).

In addition, Yin (2003) has described the following five different types of case studies and reasons for undertaking case study;

1. The ***critical case*** – this is when a case study is designed (its circumstances and suggestions) to test a theory that is believed to be true. Thus, findings from the case study is used to develop (provide further explanations or extensions), accept or even reject a theory.

2. The ***unique case*** – this is when the focus of the researcher is on clinical studies. This type of case study for example, includes the analysis of people who are diagnosed with 'rare clinical syndromes'. In such studies, people 'abilities', 'disabilities' and impact or association with other known disorders may be investigated in order to establish a 'common pattern'. In educational context a unique case could entail an investigation of a particular school, class or teacher.

3. The ***case study*** – this is when the objective of the study "[…] is to capture the circumstances and conditions of an everyday or commonplace situation" (Yin, 2003, page 41). For example, a typical case study may show how a teacher in the UK uses search engines to find relevant online resources for his/her class teaching. Thus, findings obtained from a case studies tend to be "[…] informative about the experiences of the average person or institution" (Yin, 2003, page 41).

4. The ***revelatory case*** – this is when a researcher has an opportunity to study (observe and analyse) a phenomenon that was not previously available or accessible for 'scientific' (systematic) investigation. For example, investigating teachers' increase usage of the internet and search engines for locating relevant online resources.

5. The ***longitudinal case*** – this is when a case is studied at two or more points in time, in order to establish how and when a certain condition/s described in the theory was changed over time (Yin, 2003, page 42).

Finally, as with the other four research designs discussed earlier, there are also concerns about the 'validity' and 'reliability' when adopting case studies seeing that,

> "People who have been critical of case studies often point to the fact that a case study investigator fails to develop a sufficiently operational set of measures and that 'subjective' [biased or one-sided] judgements are used to collect the data." (Yin, 2003, page 35)

All the same, researchers could *carry out a number of case studies* when addressing their research questions by having clear and systematic measures (procedures and samples) in place. Without having clear and systematic measures readers would not be able to decide on the significance of each case study or findings.

Relevance of *internal validity* in case studies is very much dependent on the nature of the case study and the researcher's decision on its appropriateness. Some writers, like Yin (2003) have highlighted the importance of establishing an internal validity in a study by suggesting a number of different strategies for increasing case studies' internal validity, (Yin, 2003).

> "[…] a case study will involves an inference every time an event cannot be directly observed. An investigator will 'infer' that a particular event resulted from some earlier occurrence, based on interview and documentary evidence collected as part of the case study." (Yin, 2003, page 36)

For others like Stake (1995), case studies' interval validity is barely mentioned. However, one question which is discussed by all writers and is central to case study research design is the concern for 'external validity', as *results from a case study will not be sufficient for 'generalisation' beyond its current samples*.

> "The real business of case study is particularization, not generalization. We take a particular case and come to know it well, not primarily as to how it is different from others but what it is, what it does. There is emphasis on uniqueness, and that implies knowledge of others that the case is different from, but the first emphasis is on understanding the case itself." (Stake, 1994, page 8)

Furthermore, to 'increase construct validity' that is fact finding in a case study, Yin (2003) recommended that researchers should adopt the following three strategies;

- ***'multiple sources of evidence'*** – using a range of different techniques such as interviews, observations, surveys, archival records (i.e. teachers' teaching folders, lesson plans, class observation reports) and or 'physical artefacts' to generate credible data for the case study.

> "[…] a physical or cultural artifact–a technological device, a tool or instrument, a work of art, or some other physical evidence […] may be collected or observed as part of a field visit." (Yin, 2003, page 96)

- ***'maintaining a chain of evidence'*** – increasing the 'reliability' of data/information collected in a case study by showing readers how the study was conducted (procedures) and indeed evaluated. Hence, increasing the ability for other researchers to replicate procedures, findings and to reach similar conclusions.

> "The principle is to allow an external observer […] to follow the derivation of any evidence, ranging from initial research questions to ultimate case study conclusions." (Yin, 2003, page 105)

- ***'case study report review'*** – improving the 'overall quality' of the case study (increasing construct validity) by collecting participants' opinions and acting upon them accordingly.

> "The procedure is to have the draft report [this could be in the form of a research prototype] reviewed, not just by peers […] but also by the participants and informants in the case." (Yin, 2003, page 159)

With this summary in mind, the next section will outlined the selected research design for this thesis.

4.3 Rationale for selected research design & methodology

Further to reviewing the suitability of the four research designs (outlined above), against the research objective of this thesis, *case study* was selected. In this thesis, the researcher found the case study as the most suitable research design for her investigation of the kind of search options and features required by teachers when personalising their search for online teaching resources.

The aim of this methodology was to find out about **teachers own view** of their required and preferred search options and features, when searching online for teaching resources. Teachers were asked about their use of online teaching resources, search options and features they used as well as their required and preferred search options when searching online for teaching resources.

Consequently, in this case study, the researcher has adopted a '*methodological triangulation'* (between-or across-method) for collecting multiple methods or sources of data. This included the use of both qualitative and quantitative data collection methods in the case study. The methodological triangulation was designed and used in multiple phases iteratively with the aid of the System Development Life Cycle (SDLC) methodology.
The System Development Life Cycle (SDLC) methodology included using *three* structured questionnaire, *one* structured observation and a semi-structured interview leading to the development of *two* search tools.

In this case study, two research prototypes (search tools) were developed and tested by teachers. The rational for design and development of the search tools was to create a channel of communication between the researcher and teachers at observation and interview sessions only (not data generation), by encouraging teachers to think about their online searching needs and preferences beyond current search tool facilities like Google, Yahoo or Bing. Thus, acknowledging the fact that investigating teachers' online searching needs and preferences would also been possible without the inclusion of search tools development such as using existing educational or generic search tools.

The concept of '*methodological triangulation'* in relation to the Mixed Method research approach together with its definition, limitations and concerns are discussed in the following section of this chapter.

4.3.1 Mixed Method Research (MMR)

Mixed Method research is an emerging paradigm (a third paradigm) that involves the use of both qualitative and quantitative methods (Collins and O'Cathain, 2009).

> "To study a single case intensively need not limit an investigator to qualitative techniques […] case study research may be either quant or qual, or some combination of both." (Gerring, 2007, page 10)

Other terms, such as 'mixed research' and 'integrated methods' are also used by researchers like Onwuegbuzi and Johnson (2006) and Teddile and Tashakkor (2009). However, the idea of Mixed Method research as the third paradigm has not been accepted by all academics and or researchers. For example, in Bergman (2008) book

chapter entitled “The straw men of the qualitative- quantitative divide and their influence on mixed methods research”, the need for more structured explanations about the research methods, purposes and reasons for combining results from different methods was highlighted, whilst carrying on to say that mixed methods design, in general,

> “[...] is able to provide an alternative to mono method designs, which – for specific research questions, under certain circumstances, and given enough resources – is not only one of the most exciting (and oldest!) research designs in the social sciences, but also an invitation to revisit well-established but obsolete assumptions about the possibilities of and limits of qualitative and qualitative methods.” (Bergman, 2008, page 19)

Nevertheless, as explained by Niglas (2010) the concept of a paradigm is still frequently used when introducing or discussing different research approaches (methods) and, the methodological paradigms are increasingly described as three broad and overlapping methodological traditions rather than as separate approaches that compete for dominance. Mixed Methods research has been defined in a number of different ways, which includes:

i) research design where QUAL (qualitative) and QUAN (quantitative) approaches are used in the form of questions, research methods, data collections and analysis procedures, and or 'inferences’ (Tashakkori and Teddlie, 2003);

ii) quantitative and qualitative data collection, data analysis and the mixing of quantitative and qualitative approaches within a case study, with data being integrated at some stage (Creswell and Plano, 2007; Creswell and Plano et al., 2003); and

iii) designs that include at least one quantitative and one qualitative method where neither type is linked to a particular inquiry paradigm (Greene and Caracelli et al., 1989, page 256).

iv) Additionally, Mixed Methods research has also been portrayed as just a description of how most people would go about researching their selected topic that involves using a variety of tools in the toolbox appropriately (Gorard, 2010).

Despite the lack of a common definition, Mixed Methods research is considered to be the 'third research paradigm' in educational research (and in the social and behavioural sciences), which moves away from traditions of separating qualitative and quantitative research (Abowitz and Toole et al., 2010; Castro and Kellison et al., 2010; Johnson and Onwuegbuzi et al., 2007; Johnson and Onwuegbuzie, 2004; Johnson and Onwuegbuzie et al., 2007; Symonds and Gorard, 2010).

> "The goal of mixed methods research is not to replace either of these approaches [qualitative and quantitative research] but rather to draw from the strengths and minimize the weaknesses of both in single research studies and across studies. If you visualize a continuum with qualitative research anchored at one pole and quantitative research anchored at the other, mixed methods research covers the large set of points in the middle area. If one prefers to think categorically, mixed methods research sits in a new third chair, with qualitative research sitting on the left side and quantitative research sitting on the right side." (Johnson and Onwuegbuzie, 2004, page 14-15)

Similarly, when using Mixed Methods, researchers are faced with a number of limitations and concerns. This includes issues concerning the quality assessment of Mixed Methods research (O'Cathain, 2010) together with the required training in methods that may be both expensive and time consuming and may require the researcher to work in multiple teams or phases (Abowitz and Toole et al., 2010; Bamberger and Rao, 2010; Johnson and Onwuegbuzie, 2004; Kadushin and Hecht et al., 2008; Onwuegbuzie and Johnson, 2006).

> "Although the benefits of mixed method research designs include increased reliability and validity of the data and greater confidence in tests of the hypotheses (and the resulting conclusions) there are added costs for both the researchers and the research subjects. Since the research costs, generally counted in terms of time, money, and energy, are not identical for each approach, and the additional costs for additional methods of data collection enter into the project at different stages for different methods." (Abowitz and Toole et al., 2010, page 115)

Nonetheless, according to Fidel (2008, page 272), one way to increase awareness and or understandings of mixed methods research (MMR) among library and information science (LIS) researchers, is for investigators to clearly outline the motivation, procedure and use of the method in their studies,

> "When authors who employ the approach [MMR] explain their motivation for its use along with its advantages and challenges and the mixing procedures they followed readers enrich their understanding of these issues and may be exposed to new ways of thinking about the approach and its implementation […] thus provide a useful foundation for future work."

Moreover, authors like Symonds and Gorard (2010, page 9) stated that Mixed Methods research has offered several key techniques important for integrating different types of data. This includes a focus on triangulation and taxonomy for creating and understanding mixed method designs. For example, triangulation can increase confidence in research data, create innovative ways of understanding a phenomenon, reveal unique findings, and provide clear understanding of the problem (Jick, 1979). The following is the definition for triangulation:

> "*Triangulation* entails using more than one method or source of data in the study of social phenomena. The triangulation metaphor is taken from navigation and military strategy, where it refers to the process whereby multiple reference points are used to locate an object's exact position." (Bryman and Bell, 2007, page 412)

There are five types of triangulation; (1) data sources triangulations, (2) investigator triangulation, (3) methodological triangulation, (4) theoretical triangulation and, (5) data-analysis triangulation. Furthermore, methodological triangulation is classified into two types '*within-method*' (methods used are either qualitative or quantitative, but not both) and '*between-method*' triangulation (Jick, 1979; Thurmond, 2001).

To summarize, multiple methods of data that is the questionnaire, observation and interview surveys were used in this case study. The sequence of evidence collected from multiple methods of data together with design guidelines of search tools were maintained using the System Development Life Cycle (SDLC) methodology, iteratively. With this approach, results were confirmed by teachers in their evaluation of the search tool and the research method was made more sophisticated with the iterative round or when the case study was repeated.

The different phases of the System Development Life Cycle (SDLC) methodology are further outlined in the following section of this chapter.

4.4 System Development Life Cycle (SDLC) methodology

In this case study, a System Development Life Cycle (SDLC) methodology was devised in order to adopt a teacher centred approach and to clearly show readers how the study was conducted and evaluated at different phases of the case study (figure 1). The concept of System Development Life Cycle (SDLC) methodology was inspired by the researcher's computer science background at undergraduate level and six years of teaching experience in Further Education College.

The System Development Life Cycle (SDLC) methodology consisted of four different phases; (1) Requirement gathering and Analysis, (2) Designing the Search Tool, (3) Developing the Search Tool' and, (4) Teachers' Evaluation of the Search Tool, with phases 2 to 4 being iterative (figure 1).

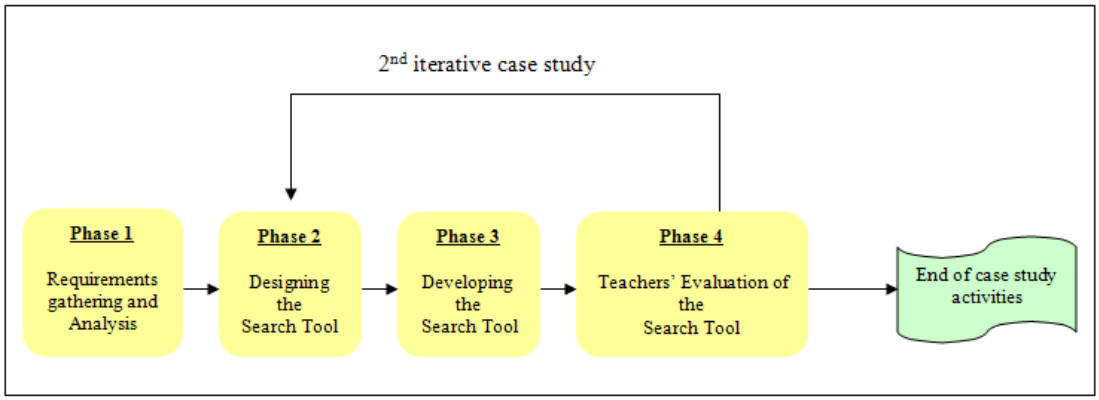


Figure 1 The System Development Life Cycle (SDLC) methodology, devised for this research.

This lifecycle methodology starts with *'Requirement gathering and Analysis' (phase 1),* where empirical research is carried out among teacher practitioners (end-users) that is using a structured questionnaire. Data from this study were then analysed to learn about individual teachers' current use of search engines, online resources, comments and or suggestions.

In *'Designing the Search Tool' (phase 2),* findings were translated into system specifications or users' system requirements. Hence, search options and features required by teachers was prepared and listed, for the design of the first search tool.

In *'Developing the Search Tool' (phase 3),* the researcher selected appropriate programming language/s for developing the teachers' search tool, by taking into

account developer's (her) level of programming skills, research time and the budget available for the search tool's implementation.

In this development, 'High-fidelity prototyping' was adopted instead of 'Low-fidelity prototyping'. In high-fidelity prototyping, the designed prototypes will represent the final system (the kind of search options and features needed) for teachers to personalise their online search. While, in low-fidelity prototyping the system would be drawn on paper or created as a mock-up for teachers' to evaluate (Preece and Rogers et al., 2002).

> "Prototypes answer questions and support designers in choosing between alternatives." (Preece and Rogers et al., 2002, page 241)

Furthermore, adapting high-fidelity prototyping enabled the researcher to produce a *tangible object* that teachers can use and evaluate. Hence, creating a *common ground of understanding* between both the researcher and teachers taking part in this study was achieved, as the researcher was able to confirm her findings with teachers through her development of the search tools and, teachers were able to communicate with the researcher through their interaction with the search tools. Finally, using the teacher-centred search tools resulted in helping individual teachers to *learn more about online searching techniques* in general as well as being able to *find relevant and or useful* online teaching resources.

In *'Teachers' Evaluation of the Search Tool' (phase 4),* individual teachers or the prospective end-users were asked to use and then evaluate the first search tool by completing an online form. Next, findings from this phase were studied to see whether it could provide sufficient answer to the research sub-questions outlined in chapter 3 of this thesis.

Therefore, when findings obtained from the System Development Life Cycle (SDLC) methodology are adequate to answer the thesis research sub-questions, the *'End of case study activities'* is reached. Otherwise, the researcher is required to do the second iterative round of the case study by going back to phase 2 of the System Development Life Cycle (SDLC) methodology and repeating phases 2 (re-designing), 3 (re-developing the first search tool) and 4 (evaluating the revised search tool), iteratively.

The research activities carried out in the System Development Life Cycle (SDLC) methodology are further described in the following sections of this chapter.

4.5 The research methods

In this thesis, two consecutive phases of the iterative case study; three structured questionnaires, one structured observation and, one semi-structured interview was carried out in order to investigate about the online searching practices and needs of teachers (figure 2).

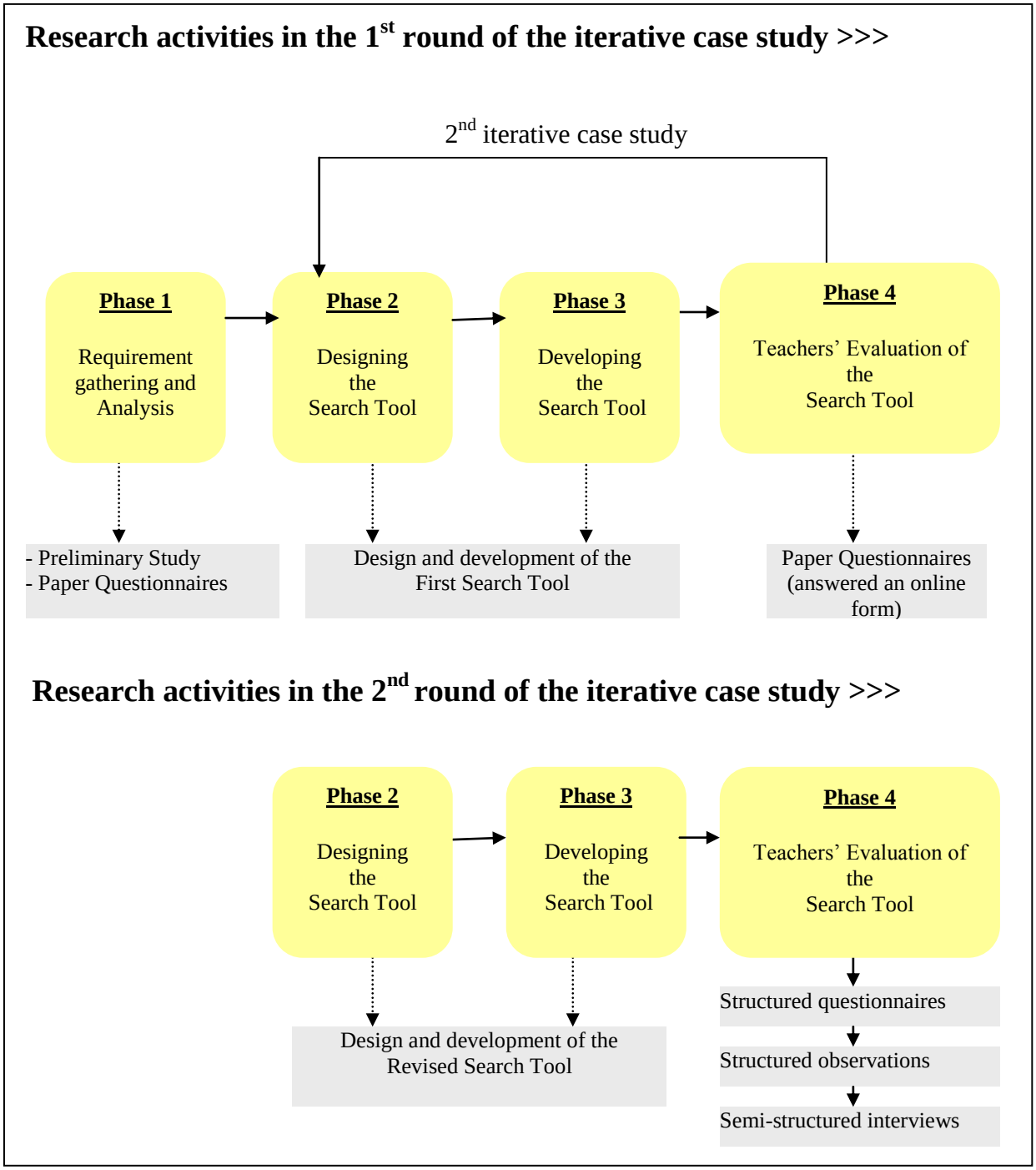


Figure 2 Research activities carried out in the two consecutive phases of the case study, iteratively.

The following section of this chapter will begin by describing questionnaire designs together with its benefits and constrains. In this chapter, research activities will be mentioned according to the phases outlined in the System Development Life Cycle (SDLC) methodology (figure 2). For example, in this chapter the researcher will refers to a questionnaire form completed online by teachers as phase four of the 1st iterative case study.

4.5.1 Questionnaire design

A questionnaire or a 'self-administered questionnaire' is a collection of questions that is directed (designed and distributed by the researcher) to respond to complete, (Bryman and Bell, 2007).

Questionnaires are mainly designed in the format of 'closed' and or 'open-ended' questions. *Closed* questions provide respondents with a fixed set of alternative answers to choose from and *open* questions require respondents to reply/answer to a question using their own words (writing sentences). Moreover useful tips and skills together with a check list for designing a self-completion questionnaire can be found in Bryman and Bell (2007).

Questionnaires can be semi-structured or structured. In semi-structured questionnaires, respondents are provided with 'multiple choice' and 'open-ended questions', which are often used by sociologists and social anthropologists to investigate different cultures or sub-cultures. In structured questionnaires, respondents are mainly provided with close-ended questions that are 'simple' and 'specific' to the researcher's topic of interest. Open-ended questions are only occasionally used in structured questionnaires as the respondents' answers are more difficult to analyse (Gillham, 2004, pages 3-5).

Moreover, as was described by Gillham (2004, page 26), topics investigated by researchers are usually categorised into the following three question types:

- Question of *fact;* this type of question is usually asked at the beginning of questionnaires in chronological order. For example, asking the age, gender and teaching experience of respondents.

- Questions about *opinions, beliefs, judgements,* examples of this type of questions includes, "Why do you choose a search engine?" or "In your opinion, if you were to use this search tool as part of your daily teaching practice what would get in your way of using it?".

- Questions about *behaviour* (what people do), for example to learn about individual teachers' current use of online resources, the researcher could ask, "Do you look for teaching materials online?".

Data obtained from structured questionnaires are 'easy' to analyse as answers are pre-defined by the researcher. However, structured questionnaires can be tedious for respondents to complete and above all researchers' ability for discovering new ideas and practices are much reduced (Gillham, 2004, pages 2-3).

> "[…] researcher determines the questions that are asked and the range of answers that can be given […] the researcher has already decided on the possible answers: all he or she wants to find out is which answers are selected." (Gillham, 2004, page 2)

The benefits of using questionnaire were listed by Gillham (2004, pages 6-13), as being a cheap and easy way of getting information from a lot of people very quickly. Additionally, problems of data quality (completeness and accuracy) and low response rate were associated with using questionnaires.

In this case study, the System Development Life Cycle (SDLC) methodology (described earlier) was used to tackle and or reduce concerns regarding data quality and questionnaire design. This methodology enabled the researcher to refine questions in the questionnaire and indeed made questions more sophisticated for every time the questionnaire survey was repeated, in different phases of the case study. Furthermore, the two paper questionnaires were delivered and then collected by the researcher, in person, in order to increase questionnaire response rate.

In total, seventy five individual teachers participated in questionnaire surveys. The teacher selection criteria were based on the researcher contacting her colleagues, friends as well as posting advertisements on teacher or educational related websites for voluntary participations. This criteria also depended on the willingness of individual teachers to continue with their voluntary participation in successive phases of the System Development Life Cycle (SDLC) methodology.

Therefore, with this summary in mind, the *three structured questionnaires* used in this iterative case study are discussed in the following sections of this chapter. The mentioned questionnaire surveys were carried out in phase one of the 1st round of the case study, phase four of the 1st and 2nd rounds of the case study, respectively.

4.5.1.1 Paper questionnaire

To learn about the current use of search engines, online resources, preferences, search options and features of individual teachers, a structured questionnaire was designed. This questionnaire was first piloted among PGCE (Post Graduate Certificate in Education) teachers and one questionnaire expert at the Institute of Education (IoE).

Piloting the questionnaire resulted in highlighting the importance of making direct connection (relevance) between each question in the questionnaire and the thesis research questions as well as identifying a number of design and layout problems (appendix I; sections A and B). Feedbacks received from PGCE teachers and the questionnaire expert was therefore used to develop the first structured questionnaire of the case study.

The structured questionnaire consisted of four parts, and eighteen questions that included fourteen closed-ended and four open-ended questions. Part *one*, was designed to profile individual teachers' demographic information and experiences, asking the contact details, gender, teaching level, subject area and teaching experience of individual teachers. In part *two*, teachers were asked about their use of online resources and or likes of search features. In part *three*, teachers were asked about their use of search engines for online teaching resources; and in part *four*, teachers were asked their ideal search engine (appendix II).

4.5.1.2 Paper questionnaire (an online form)

In this thesis, a questionnaire form was designed for individual teachers to evaluate the first search tool designed in phase four of the System Development Life Cycle (SDLC) methodology (appendix III; section A).

This questionnaire consisted of thirteen questions from which six were re-used from the paper questionnaire discussed above. Question numbers one to six of the paper questionnaire (4.5.1.1) were re-ask in order to collect information about new teachers (volunteers) participating in phase four of the case study.

In this particular phase, individual teachers were able to opt-out from future studies. Hence access to the same teacher was not guaranteed in all stages or phases of the case study. Consequently, the researcher decided to repeat some questions from the paper questionnaire to maintain a complete set of data about participants, at all times (appendix III; section B).

4.5.1.3 Revised paper questionnaire

In this thesis, a second paper (structured) questionnaire was designed to collect information about the demographic information and experiences of teachers; gender, age, level, subject, teaching experiences, teachers' web and search engine experiences. This revised paper questionnaire was distributed to individual teachers before their evaluation of the revised search tool, in the second round of the case study.

Moreover, out of the seventy five individual teachers who participated in this case study, thirty of them participated in phase four of the 2nd round of the case study. This included completing the revised paper questionnaires and evaluating the revised search tool by the structured observations and semi-structured interviews, discussed in the following sections of this chapter.

This revised paper questionnaire consisted of twelve questions of which eleven were re-ask with some modifications from the first paper questionnaire, as individual teachers' continues participation with this case study was not guaranteed.

Modifications included the insertion of 'Age' in question 1 and the transformation of two closed-ended questions. The two questions were re-ask in this questionnaire by changing its format from open-ended questions to closed-ended questions. Possible answers for each question was derived from individual teachers' responses to questions 10 and 11 of the first paper questionnaire, discussed earlier.

- What do you like most about searching online for your teaching materials? *(you may tick more than one box)*

  - "Speed of information and variety of information"
  - "The variety of resources available"
  - "Finding things I didn't originally set out to"
  - "Instant Success!"
  - "It makes it possible to find a topic explained in various ways"
  - All of the above
  - Other

- When searching online for your teaching materials, what features or characteristics do you dislike? *(you may tick more than one box)*

  - "Wasted time in fruitless searches"
  - "The variety of resources available"
  - "Too many results and becoming distracted"
  - "Materials that are not clearly linked to the national curriculum"
  - "Cluttered Images"
  - All of the above
  - "Nothing"
  - Other

Moreover, a new question was added to this questionnaire. In this question, teachers were asked about their web and search engine experiences.

- Think about the following two statements and choose your answer accordingly.

  (a) "I have a **lot** of experience in using the **Web**"

  - Strongly agree
  - Mostly agree
  - Neither agree nor disagree
  - Mostly disagree
  - Strongly disagree

  (b) "I have a **lot** of experience in using **search engines**"

  - Strongly agree
  - Mostly agree
  - Neither agree nor disagree
  - Mostly disagree
  - Strongly disagree

This particular question was adopted from Madden and Eaglestone et al. (unpublished work) with modification in its scoring mechanism. Originally a score rating of 1-5 was used to collect participants' answers but in this round of the case study, the researcher decided to use tick boxes, instead. Finally, this questionnaire

was completed by teachers on the same day and location as their individual observation and interview, outlined in phase four of the 2nd round of the case study.

4.5.2 Structured observation

There are three main types of observations entitled 'structured', 'semi-structured' and 'unstructured' observation. Structured observation is a type of 'non-participant observation' where the researcher is required to look at one particular event or single behaviour. Hence, this type of observation will ultimately restrict the researcher to a single set of information or data type (Gillham, 2008).

> "You know exactly what you want to find out and the form of the data is precisely specified […] [but with this techniques there is] not much scope for discovery and the underlying reasons lag somewhere behind." (Gillham, 2008, page 19)

In a semi-structured observation, the researcher has 'specific' research questions in mind however findings tend to be unpredictable. Accordingly, Gillham (2008, page 4) made the following useful comparison between structured and unstructured observation (table 5).

Structured	Unstructured
• relatively economical on time (even including the development phase) • data largely quantitative in character • detached non-participant observation • data easily summarized • data essentially superficial • limited linkage to social context • not suited to the study of extended and elaborate sequences of behaviour	• very expensive on time [time consuming] • data largely qualitative • participant observation • data require extended presentation • data capable of analysis of meaning in depth • embedded in social context • behaviour viewed as part of a complex social interaction

Table 5 Comparison between structured and unstructured observations, taken from Gillham (2008, page 4).

Lastly, in an unstructured observation, the researcher is actively participating in his/her observation over a defined period of time such as weeks, months or even years. This type of observation is usually associated with 'ethnography' studies, where the objective of the researcher is to look at 'rules' and 'practices' of a single 'culture' or a 'minority' group. Hence, in unstructured observations the,

> "[…] ethnography is concerned with elucidating [explaining] the character of a particular culture. [whereas in] A case study may involve an individual, or individuals, in widely different settings or institutions – such as a national organization of professionals – which is not located in a single or simple setting." (Gillham, 2008, page 42)

Nonetheless, observations tend to have low 'validity' and weak 'generalization', as researchers can hold different perceptions about a single situation or behaviour in their observation, especially when analysing information or data.

> "The question of validity (how accurate these self-reports are) is not a simple one because people 'construct' their understanding of themselves; and how is anyone to say whether these self-constructions are accurate?" (Gillham, 2008, page 1)

Furthermore, as was explained by Gillham (2008, page 100):

> "Observation cannot tell the whole story; and even when extended over time it can only incorporate a narrow section of the evolution of a group, a culture, or an individual."

Nevertheless, observation can be a very useful method, if incorporated with other methods such as interview and questionnaire.

Therefore, with this background information in mind, structured observations were carried out among thirty individual teachers in phase four of the 2nd round, in this case study (chapter 7 and appendix V). Individual teachers' observation of the revised search tool was carried out straight after the structured questionnaire, described earlier in this chapter (section 4.5.1.3). In this observation, teachers were asked to perform the following two tasks:

- **Task 1** – teachers were asked to perform a *single* search session using the revised search tool called 'PoSTech' (Personalised Search Tool for Teachers). In this task, teachers were encouraged to search for online information or resources that they needed for their up-coming teachings. In this task teachers were able to *repeat search queries* as many times as they desired.

- **Task 2** – teachers were asked to REPEAT their query but only after clicking and viewing all the other available search options and features in the revised search tool. In this task, teachers were also able to *repeat search queries* as many times as they desired before making their final selection of the kind search options they need and clicking on the 'Search' button.

The duration and number of search queries performed by individual teachers in search session was noted. The duration of each session was determined by teachers finding a useful online resources or their decision to abandon the search query. Hence, a task ended when a teacher found a useful resource(s) or when the teacher abandoned his/her search (teacher gave up).

Accordingly, an observation schedule, in a form of table, was designed in connection with Gillham's (2008) observation check-list/recommendation. This table consisted of 22 columns and four rows. The first column contained information about teacher's ID number, onset time, location and duration of the observation. The second column contained information about individual teachers' search information. This included the query/keywords and Boolean operators used by teachers as well as the kind of search options that were used by teachers when searching online via the revised search tool. In addition, (the remaining) twenty columns were equally divided into task 1 and task 2. Each of these column represented teacher's repeated search queries that was ranged between a minimum of 1 repeated search query to a maximum of 10 repeated search queries (chapter 7; sections 7.3 and 7.4 and appendix VII; section D).

In this observation, the researcher also used a recoding tool called '*My Screen Recorder v2.65*' (Deskshare 2006), in order to capture or record individual teacher's search sessions and comments, when searching online via the revised search tool.

The researcher was inspired by this particular recording tool ('My Screen Recorder'), as it was previously used by Madden and Eaglestone et al. (unpublished work) study of online searching behaviour/practices of participants.

Therefore, with this recording tool, search queries performed by individual teachers were captured in a form of screenshots (video clips). This involved recording their selected search options and typed keywords. Additionally, individual teachers were encouraged by the researcher, to think loud, when searching online using the revised search tool.

4.5.3 Semi-structured interview

In this section, four main types of interviewing entitled (1) 'informal', (2) 'unstructured', (3) 'structured' and (4) 'semi-structured' interviews are described

briefly by highlighting the different types of data that can be produced from each technique and, their usefulness for different types of research projects.

(1) ***'Informal interviews'*** are mainly used at the very early stages of the study to plan research procedures, samples etc. and to discover new research topics. In an informal interview the researcher will tend to rely on his/her memory to write field notes.

(2) ***'Unstructured interviews'*** are mainly used when the researcher is conducting longitudinal studies or "[…] have lots and lots of time […] and can interview people on many separate occasions." (Bernard, 2000, page 191) With this technique, researchers have a 'clear plan' in mind, but will not be directing participants' discussions during the interview, in any way what so ever.

(3) ***'Structured interviews'*** are used when the researcher need to follow an 'interview schedule' and when respondents' next question is very much dependent on his/her earlier answer. For example, if a teacher said she never searches online for teaching materials, then question 5b is asked (Bernard, 2000; Yin, 2003). And, finally,

(4) ***'Semi-structured interviews'*** are used in situations where the researcher needs to cover selected topics but would also like the participants to be responsive to their questions. This method can also be useful in situations where researchers don't have a second chance to interview participants (Bernard, 2000, page 191). For example, interviewing a teacher for the second time would be subject to the availability of a cover teacher, research funding and indeed teacher's willingness and or teaching timetable.

> "Interviews are often applied in *case studies*, which focus on a specific person, situation or institution" (Kvale, 2007, page 46).

Accordingly, an 'interview guide' is used to control the direction of discussions in the interview. The researcher will be following a list of questions and topics systematically.

> "The interview stage is usually prepared with a script. An interview guide is a script that structures the course of the interview more or less tightly [...] For the semi-structured type of interview […] the guide will include an outline of topics to be covered, with suggested questions" (Kvale, 2007, pages 56-57).

Moreover, appropriate 'probing' techniques are used in the semi-structured interviews to clarify questions for teachers or to generate further information/explanations without influencing participant's answers, i.e. the 'Silent' and 'Tell-Me-More' probes (Bernard, 2000).

To summarize, findings in this thesis are based on teachers own view that *cannot be generalised* to English teachers teaching UK syllabus, as this case study was carried out among seventy five teachers only that is two primary schools in London, one primary school in Kent, three secondary schools in London and two post-compulsory schools in London. In this case study, results are representative of the individual teachers who teach in primary, secondary or post-compulsory schools. Moreover, observation of the individual teachers was carried out in *an artificial setting* and *not in their natural setting*; teachers were asked to carry out two search tasks via the revised search tool (chapter 8, section 8.4).

In this case study, a semi-structured interview was designed in order to further learn about the web searching needs and practices of individual teachers (chapter 7). Hence, this technique was the third research instrument that was used in phase four of the 2nd round of the case study. In this study, individual teachers were interviewed straight after their evaluation of the revised search tool (structured observation), discussed earlier in this chapter (section 4.5.2).

The interview guide prepared and used for the semi-structured interviews contained ten questions from which three questions were re-ask, with slight modification in their wording, from the online questionnaire that was discussed earlier in this chapter (appendix VI; questions 4, 5 and 7). Finally, interview surveys were recorded using 'My Screen Recorder' and was then transcribed for further analysis. This tool was also used to record teacher's saying when evaluating the revised search tool or in the observation surveys (appendix VII; section F).

Details of samples used in this case study are further described in the following section of this chapter.

4.6 Samples used in this study

According to Marshall and Rossman (2006, page 62),

> "One cannot study the universe–everything, every place, all the time. Instead, the researcher makes selections of sites and samples of times, places, people, and things to study."

Hence, in this section, approaches and steps taken by the researcher to select teachers in the case study are outlined.

In total seventy five individual teachers (excluding those who participated in the preliminary study) were surveyed in this case study; thirty teachers in phase 1 and fifteen teachers participated in phase 4 of the case study, respectively. Along with, thirty teachers who participated in phase 4 of the 2nd round of the case study (table 6).

1st round of the case study	Number of Teacher Participants		
	Primary	Secondary	Post-compulsory
Phase 1 → Paper Questionnaires	10	10	10
Phase 4 → Paper questionnaires (completed online form)	4	6	5
2nd round of the case study	**Number of Teacher Participants**		
	Primary	Secondary	Post-compulsory
Phase 4 → Structured questionnaires Structured observations Semi-structured interviews	11	8	11

Table 6 Number of teacher participants in each phase of the case study

Out of the seventy five teachers who participated in this case study, twelve teachers continued their voluntary participations on more than one occasion, such that a teacher agreed to evaluate both the first and the revised search tool (appendix VII; section A). Teachers who participated in phase 4 of the 1st round of the case study (evaluated the first search tool) were re-called to continue their participation in phase 4 of the 2nd round of the case study (evaluate the revised search tool), that is questionnaire, observation and interview surveys using the revised search tool (section 4.7).

Hence, out of the fifteen teachers who evaluated the first search tool, four teachers that is teacher numbers 3, 10, 13 and 14 were participating in phase 4 of the 1st round

of the case study for the second time by agreeing to evaluate the first search tool using the questionnaire form online and, the remaining eleven teachers were participating for the first time (appendix VII; section A).

Furthermore, out of the thirty teachers who evaluated the revised search tool, three teachers that is teacher numbers 10, 13 and 14 continues participation in phase 4 of the 2nd round of the case study by agreeing to evaluate both the first and the revised search tool and, the remaining twenty seven teachers were participating for the first time appendix VII; section B).

In this case study, teachers were from primary, secondary and post-compulsory schools, working in UK educational settings. The number of teachers who participated in preparing and conducting the paper and online questionnaires together with the structured observations and semi-structured interviews are further outlined in the following sections of this chapter.

Structured paper questionnaires – to call for the participation of individual teachers in this paper questionnaire, one hundred and forty two schools in affiliation with IoE were contacted by email; *twenty five* primary schools, *one hundred* secondary schools and *seventeen* post-compulsory schools in London.
The UK schools and colleges database (www.schoolswebdirectory.co.uk) was also searched to find other individual teachers. Schools were randomly selected from the database, subject to their accessibility and order of the list, since some schools (WebPages) in the database were found to have dead links, unknown/out-of-date email addresses (often emails were undelivered) and missing links.

Consequently, due to the above restrictions and researcher's time-line, head teachers of an *approximately fifty* 'local education authority' (LEA) schools and further education (FE) colleges in the UK were emailed to ask for individual teachers' voluntary participation in the questionnaire survey.

Finally, the researcher contacted and or emailed the college where she was teaching as well as *four* local schools near her house (in London), and two other schools (a primary school in Folkestone, Kent and a secondary school in Hammersmith,

London) that were previously in partnership or collaboration with the iClass project (Intelligent Distributed Cognitive-based Open Learning System for Schools).
iClass project was aimed at design and developing an educational software to personalise the learning needs and preferences of teachers; this was the project which the researcher was working for at the time. This contact was with the permission of her line manager and in accordance to her job description (roles and responsibilities).

At the end of this phase, 30 teachers (10 primary, 10 secondary and 10 post-compulsory) agreed to take part in the questionnaire study.

Structured paper questionnaires (completed online form) **–** In this study, individual teachers were required to give their comments and suggestions about the search options and features, provided in the first search tool by completing an online form.
To evaluate the first search tool, t*wenty two* teachers who participated in phase one of the 1st round of the case study were contacted (appendix VII; section A). Teachers who participated in the paper questionnaire survey, discussed earlier in this chapter, and said 'YES' to question 1C (allowed the researcher to request for continued participation) were contacted by email and or in person in order to use and evaluate the first search tool (appendix II).
These particular teachers were re-contacted, since the design specification or requirements of this search tool was derived from their comments and suggestions made previously. These teachers were therefore considered to be the most suitable teachers (candidates) to evaluate the first search tool, developed in the 1st round of the case study. The researcher also asked colleagues and friends to help her with locating other teacher practitioners in the UK educational settings by circulating her email to other teachers in their department.

At the end of this phase, *fifteen* individual teachers (4 primary, 6 secondary and 5 post-compulsory) agreed to take part in the online form.

Structured paper questionnaire, observation & semi-structured interview **–** to evaluate the revised search tool, teachers who participated in phase four of the 1st round of the case study were contacted. Teachers who completed the online form (discussed above) and said 'YES' to question 1C were contacted by email and or in

person once more in order to for them to evaluate the revised search tool that resulted in identifying *four* teachers (appendix VII; section B).

However, due to the low turnout of teachers' voluntary participation and teachers' unwillingness or availability to continue with their participation in this study, an advert was placed in known educational forums and mailing groups in order to involve more teachers in this case study. This included the 'DfES Standards Site Forums', 'Teacher Resource Exchange', 'TeacherWatch – 'Teacher Forum UK', 'Teachers Talk', Technology Teacher Forum' and 'Becta ICT research network'.

Furthermore, as a token of appreciation, the researcher donated £1 to the SOS Children's Villages (charity number 1069207), for every completed questionnaire. This information was stated in all the online adverts and consent forms. The charity SOS was also informed of this decision prior to the posting of messages. Finally, in return for schools' support, the researcher agreed to help with school's website design and technical/computer problems of their teachers, together with working as the school's receptionist (mainly during lunch times).
At the end of this phase, *thirty* teachers (11 primary, 8 secondary and 11 post-compulsory) agreed to take part in this round of the case study.

Steps taken to access English teacher practitioners in this case study and, measures to make the two search tools available to teachers are described in the following sections.

4.7 Access to English teacher practitioners

The ways that teachers (samples) were approached and facilitated in this case study are described in the following sections. This included piloting of the first paper questionnaire, the two structured questionnaires, structured observations and semi-structured interviews.

Piloting structured questionnaire (paper) **–** in this case study, a pilot study of the paper questionnaires were conducted among PGCE (Post Graduate Certificate in Education) teachers at the Institute of Education (IoE). These teachers and or tutors were considered to have the relevant experience and knowledge of teachers in the

UK's educational setting and, thus were considered to be the most suitable candidates for this preliminary study.

To pilot the paper questionnaire among PGCE teachers at the Institute of Education (IoE), a list of all PGCE primary, secondary and post-compulsory teachers or lecturers was prepared. This list contained the names, subjects and email addresses of teachers. This list was put together using the PGCE course prospective as well as contacting the administration office at the University. Consequently the questionnaire was distributed among *eighteen* PGCE teachers included two primary teachers; two post-compulsory teachers and fourteen secondary teachers (one teacher from each taught subject).

Further to teacher's acceptance of participation, a paper questionnaire was either delivered to his/her office in person or it was placed in their pigeon hole, in their absence. The researcher also contacted the doctoral office at the Institute of Education, to enquire about questionnaire expert at the University and was then contacted by email. A copy of the questionnaire was sent to the questionnaire expert in order to obtain advice and further suggestion for improving the questionnaire design of the case study (appendix I; section B).

The researcher also consulted a questionnaire expert at IoE in order to improve the design and layout of the paper questionnaire. Feedback from this piloting study is briefly discussed in section 4.5.1.1 of this chapter. Moreover, the analysis of the preliminary study will not be discussed in this thesis as the aim of this study was mainly to pilot the questionnaire design.

Structured paper questionnaire – in this phase of the case study, a new or improved version of the structured questionnaire was prepared and printed in A5 booklet format. The size A5 was chosen by the researcher, in order to ease the handling of questionnaires. Hence, further to schools or individual teachers' acceptance of participation, the paper questionnaires were sent to their schools by post or were emailed to them depending on their individual preferences and the completed questionnaires were then posted or emailed back to the researcher.

Structured paper questionnaires (completed online form) – the first search tool that was designed in phases two and three of the 1st round of the case study was developed using the 'Microsoft Visual Basic programme', version 6.0 software and 'Visual Basic Language' (VB). Moreover, the online form used for obtaining individual teachers' evaluation of the first search tool was placed online using the 'SurveyConsole'. To use the 'SurveyConsole' system, the researcher paid $15.00, each month, for four months.

This online form was embedded into the first search tool via a button or website link (URL Link). A button was placed in this search tool, directing individual teachers to the online form, with a label saying *"Please click here to SEND us your opinion"* (appendix VIII; sections C and G).

The search tool (software) was sent to individual teachers via email as an attachment or alternatively it was posted to their school in CD format, upon their request. This search tool was a 'stand alone' software, which required individual teachers to install the software onto their computer or desktop.

In addition, the software was placed on the personal webpage of researcher at the Institute of Education (IoE); a safe and recognised webpage for teachers to access and download the first search tool via the internet. The main reason for this was to overcome or at least to support individual teachers with possible downloading restrictions imposed by schools email and or networking system. It was predicted that due to mailbox size and or school's email protections some teachers' may not be able to open their attachment, as the software included an '.exe' file.

Finally, the researcher also made a 'demo video' of the search tool using software called 'Camtasia Studio Screen Recording and Presentation'. The aim of this video was to visually inform teachers of all the features and capabilities of the search tool (appendix VIII; section H).

Structured questionnaire, observation & semi-structured interview – in phase two and three of the 2nd round of the case study, the revised search tool was created using 'Visual Studio 2005' software, written in both 'Visual Basic' (VB) and 'HTML' language. In addition, the researcher purchased a web hosting package called 'Windows BusinessHost+' and a domain name (a unique website address) called "www.postech.me.uk", from a company called 'Namesco Limited', in order to make

the revised search tool available online. To use this hosting package the researcher paid £234.99, annually, for two years (chapter 5; section 5.5.1).

In this case study, questionnaire, observation and interview surveys were all carried out at the school (workplace) of the individual teachers using a personal laptop (Toshiba Equium, Windows Vista, Home Premium) and the 'My Screen Recorder v2.65' software.

4.8 Ethical considerations

The ethical approaches taken in this case study are described in following paragraphs of this section. The importance of having ethical consideration in research was highlighted by Marshall and Rossman (2006, page 82),

> "The researcher cannot anticipate everything, but she must reveal an awareness of, an appreciation for, and a commitment to ethical principles for research." (Marshall and Rossman, 2006, page 82).

Although the data collected in this case study is not classified as being sensitive or harmful to the individual teachers who participated in this research, nevertheless the researcher ensured that the following ethical responsibilities were satisfied.

Informed consent and voluntary participation – information about the case study and rights of the participants was outlined in the cover letter, attached to the front of each questionnaire. Moreover, Gillham (2008, page 92) explained that,

> "Informed consent is now a standard requirement by universities and other regulatory bodies when human subjects are involved directly, i.e. by their active participation or through demands being made of them." (Gillham, 2008, page 92)

This cover letter provided teachers with a brief introduction to the case study, its purpose, participant's rights and data protection act. In this letter, the researcher explained that participation is voluntary and that the respondent is free to withdraw at any time during the study or decline to answer any question. The full name and contact details of the researcher was also added to this letter, allowing teachers to contact her with their queries and or questions (appendices II, III; section A and IV).

Anonymity and confidentiality **–** to ensure anonymity and confidentiality each completed questionnaire was labelled with a unique questionnaire code. This code was placed on the top right hand side (front cover) of each questionnaire (appendix II). The importance of having Confidentiality and anonymity in research was explained by Rapley (2007, page 30),

> "*Confidentiality and anonymity* are usually achieved by: Never disclosing any personal identifying details of participants when talking to others, unless they are part of the project team. [and] Removing all details that could identify either the specific participants or the precise location of the research site from any transcripts or research reports."

Labelling questionnaires with unique codes enabled the researcher to ensure anonymity. Also, finding retuned questionnaires was speedy and more effective particularly, when analysing data that involved referring back to the original data. At the end, paper questionnaires (hard copies) were stored securely in a filing cabinet. This decision was in accordance with Rapley's (2007, page 31) recommendation of,

> "Keeping all recordings and copies of any details that could identify participants (e.g. consent forms, recruitment records) in secured cabinets or drawers […] this includes keeping all the relevant electronic files or documents secured files or on secure servers, where only you or the research team has access."

Privacy **–** the researcher anticipated that further to the analysis of questionnaire surveys, she may need to contact the individual teachers for further clarification on their responses or to ask for continues participation in the next round of the case study that is evaluation of the revised search tool. Therefore individual teachers were asked to provide their email address in part one of the structured questionnaires. Furthermore, to avoid violating individual teachers' privacy rights, the researcher informed participants of her intention and asked to permit her to make future contacts (appendices II, III; sections A and IV).

Accordingly, in the questionnaire form (phase 4 of the 1st round of the case study), information and participants rights were also embedded into the first search tool. This page was accessible to teachers via a button labelled "[Info]" (appendix VIII; sections C). Furthermore, a 'user manual', containing information about the search tool 'installation procedures' and 'troubleshooting' together with the contact details

of the researcher was prepared in Microsoft Word. The aim of this user manual was to familiarise individual teachers with the first search tool and indeed to ease the task of downloading and installing a new software onto their desktop. This manual was sent to individual teachers via an email or was saved on CD's for posting (appendix VIII; section G).

Similarly, all ethical considerations discussed and used in the first round of the case study for paper and form questionnaires were amended when evaluating the revised search tool, in phase four of the 2nd round of the case study. For example, Kvale (2007, 55) described the following interview procedures;

> "The interview is introduced by a *briefing* in which the interviewer defines the situation for the subject, briefly tells about the purpose of the interview, the use of a tape recorder, and so on, and asks if the subject has any questions before starting the interview." (Kvale, 2007, 55)

The consent form used in the second round of the case study was revised by adding additional information about the case study 'search tasks', estimated duration of the study and the recording software ('My Screen Recorder v2.65') used in the study. In this consent form, individual teachers were informed that time taken to complete the study will be approximately 25-30 minutes. This included completing the questionnaire, observation (two tasks) and the interview (appendix IV).

In this phase of the study, individual teachers were briefed about the revised search tool features and functionality prior to carrying out their observation tasks (discussed earlier in section 4.4.1.1) using annotated screenshots of the revised search tool (appendix V). Hence, teachers were asked to read and sign a consent form prior to their completion of the structured questionnaire, observation and the semi- structured interview. An unsigned copy of this form was given to teachers for their reference. When completing the structured questionnaires, individual teachers were also given the option of receiving the case study findings via email (appendix IV).

A copy of teachers' recorded search sessions were also provided upon request, for instance in one particular case, an individual teacher requested to have a copy of her sayings (video recording) straight after being interviewed.

4.9 Data analysis

This section outlines the steps taken to prepare and analyse data obtained from the case study. This includes the three structured questionnaires, structured observations and semi-structured interviews (figure 2). According to Yin (2003, page 109),

> "Data analysis consists of examining, categorizing, tabulating, testing, or otherwise recombining both quantitative and qualitative evidence to address the initial propositions [research questions] of a study."

In this case study, 'univariate analysis' and 'content analysis' were used to analyse quantitative and qualitative data. In this section, the researcher will *not* talk about the analysis of data obtained from the preliminary study, as the focus of the preliminary study was on designing the structured questionnaire. The steps and procedures used to analyse data in this case study are outlined in the following sections of this chapter.

4.9.1 The analysis of quantitative data

As outlined by Babbie (2008), techniques used for analysing quantitative data can be grouped into three groups; (1) univariate analysis, (2) bivariate analysis and (3) multivariate analysis.

In this case study, 'univariate' was used to describe and summarize the data obtained from questionnaires, in phase one and four of the 1st round of the case study together with the paper questionnaires and observations in phase four of the 2nd round of the case study, in the form of frequency tables (chapter 5; sections 5.2 & 5.4 and chapter 6).

Univariate analysis was used to describe the responses of teachers to a single variable such as teachers' usage of search services. The number of teachers selecting their search service usage was recorded (e.g. chapter 6; table 19). This data was regarded as being descriptive information. According to Babbie (2008, page 467);

> "Univariate analysis is the analysis of a single variable. Because univariate analysis does not involve the relationships between two or more variables, its purpose is descriptive rather than explanatory."

Hence, bivariate analysis (and multivariate) analysis was not considered in this study, as bivariate analysis is used to describe the responses of teachers with two variables, simultaneously. For example, investigating the relationship between teacher's gender and their frequency of search service usage was outside the scope of this research. According to Babbie (2008, page 468);

> "Bivariate analysis focuses on relationships between variables rather than comparisons of groups. Bivariate analysis explores the statistical association between the independent variable and the dependent variable. Its purpose is usually explanatory rather than merely descriptive."

Furthermore, when analysing data obtained from the case study, the researcher decided *not* to use computer programs or software like SPSS for creating frequency tables, as the sample size was manually manageable.

The following text, will describe steps taken to prepare data obtained from the three structured.

Structured paper questionnaires – the following steps were carried in phase one of the 1st round of the case study, to prepare responses from teachers for analysis:

(i) A unique ID, like 'T1' (Teacher number 1) was allocated to each completed questionnaire. Questionnaires were coded with unique ID's in order to comply with the confidentiality and anonymity regulations expected from researchers or in research.

(ii) The responses received from individual teachers were inserted into a table. This table consisted of twenty columns and thirty rows. Each column represented one of the questions in the paper questionnaire e.g. question 5, and each row corresponded to one individual teacher that is ID number (appendix VII; section A).

(iii) A tally count of the responses of teachers' answers and commentaries were prepared by the researcher. Suggestions and comments made by teachers were either grouped into new categories or they were added to relevant categories in the question. Individual teachers' suggestions and comments were usually provided in open-ended questions or in each question under the option 'Other'.

(iv) Nine frequency tables were created using the numbers obtained from the above tally counts. These tables were then used to analyse data obtained from question numbers 9 to 17 of the questionnaire (chapter 5; sections 5.4-5.5 and appendix VII; section A), and lastly,

(v) Information obtained from individual teachers' suggestions and comments together with the nine frequency tables were used to list possible search options and features for the design of the first search tool.

Structured paper questionnaires (completed online form) – the following steps were carried in phase four of the 1st round of the case study, to prepare responses from teachers for analysis:

(i) The responses of teachers, collected via the online form, were downloaded from 'SurveyConsole' (online questionnaire software) onto a word document. This information included the responses of teachers to both closed and open-ended questions.

(ii) A unique ID, like 'T1' (Teacher number 1) was allocated to each online form.

(iii) The responses of individual teachers were then inserted into a table. This table consisted of twenty four columns and fifteen rows. Each column represented one of the questions in the online forms e.g. question 5, and each row corresponded to one individual teacher, which was denoted by their ID number, for example, 'T1'.

(iv) A tally count of the responses of teachers' answers and commentaries were prepared by the researcher. Suggestions and comments made by teachers were either grouped into new categories or they were added to relevant categories in the question. Individual teachers' suggestions and comments were usually provided in open-ended questions or in each question under the option 'Other'.

(vi) Nine frequency tables were created using the numbers obtained from the above tally counts. These tables were then used to analyse data obtained from question numbers 9 to 17 of the online forms in relation to the thesis research sub-questions (chapter 5; sections 5.4 and 5.5 and appendix VII; section B).

Structured paper questionnaire – the following steps were carried in phase four of the 2nd round of the case study, to prepare responses of teachers for analysis:

(i) A unique ID was allocated to each completed paper questionnaire.

(ii) The answers selected by individual teachers were inserted into a table. Each column was associated to one of the questions in the paper questionnaire.

(iii) A tally count of the responses of teachers' answers and commentaries were prepared by the researcher.

(iv) This data was then used to create a table, showing an overview of the options selected by teachers in the questionnaire. Where applicable, suggestions and or commentaries made by teachers were grouped into a new category or were simply added to a relevant category of the same question. Suggestions and or comments were stated in question 4 (an open-ended question that was designed to ask about individual teaching experience) or in most questions it was stated under the option 'Other' (chapter 6 and appendix VII; section C).

Structured observation – the following steps were carried in phase four of the 2nd round of the case study, to prepare responses of teachers for analysis:

(i) A unique ID or file name was allocated to each screen recordings. Hence, the same ID number as the above paper questionnaires was used to ensure consistency of ID's and to comply with the confidentiality and anonymity regulations.

(ii) An observation schedule containing 30 tables was prepared with each table representing a single teacher.

(iii) Each interview (file type .avi) was watched thoroughly using Windows Media Player and, relevant information was inserted into each of the 30 tables. For example, the researcher made note of 'Teacher_1' typed search keywords and, her selection of search options via the revised search tool.

(iv) A tally count of teacher's search options selected and search keywords typed was prepared by the researcher, with the aid of the observation schedule.

(v) This data was then used to create a table, showing an overview of search options selected by teachers in the questionnaire within the context of the

research questions stated previously in chapter 3 of this thesis (chapter 7; section 7.5 and appendix VII; section D).

4.9.2 Content analysis

In this case study, 'content analysis' was used to prepare and analyse data obtained from the observation and interview surveys (chapter 7; sections 7.4 and 7.6) in phase four of the 2nd round of the case study. Content analysis was used as according to Weber (1990, page 9);

> "Content analysis is a research method that uses a set of procedures to make valid inferences [description] from text. These inferences are about the sender(s) of the message, the message itself, or the audience of the message."

However, as described by Berelson (1971), using content analysis can encounter problems of validity, reliability, sampling, presentation and inference. Consequently, to deal with issues of data validity, reliability and inference, the researcher has used a systematic approach when preparing and analysing the data obtained from teachers interviews and has consulted experts at different stages of her analyses. And as explained by Berelson (1971, page 171);

> "[...] in most cases validity does not seem to be a major problem in content analysis. Most of the time, careful definition of categories and judicious and alternative selection of indicators will take care of the matter."

Additionally, conclusions drawn from analysing the interview data were discussed in the context of the thesis's research questions (chapter 7; section 7.9). Hence, as highlighted by Berelson (1971, Page 195), the researcher checked that:

> "[...] full and unambiguous statements of the detailed inference itself, of the line of reasoning that went into it, and of the assumptions contained therein would serve the cause."

In this section, the researcher did NOT use computer programs or software like NVivo to prepare and or organise her data for the content analysis, as the data and tasks involved (finding new categories and or generating new themes) were manually manageable. And as Holsti (1969, page 194) has explained;

> "[...] it may be well to conclude on a more cautious note [that] Just as all research does not lend itself to content analysis, not all content analysis should be done by computer."

Finally, the nature of the data derived from the evaluation of the revised search tool (observations) and interviews are described next.

> "In the large majority of [content analysis] cases it is possible to devise a representative and adequate sample which is economical of administration [...] In short, whatever can be said about the value of sampling in other areas of social research applies with equal force to sampling in content analysis." (Berelson, 1971, Pages 174-175)

Structured observation – in this phase, keywords typed by teachers were grouped according to their use of basic search tools that is searching in 'Plain English', 'Multiple' words and phrases, and searching using other characters & capital letters (chapter 7; section 7.3). Information about the keywords typed by teachers was derived from the completed observation schedules (30 tables, described earlier). A frequency table is also used to discuss search options selected by the individual teachers when using the revised search tool (chapter 7; section 7.4 and appendix VII; section D).

Semi-structured interview – the following steps were carried in phase four of the 2nd round of the case study, to prepare responses of teachers for analysis:

(i) The 30 interview recordings were transcribed and then a unique ID was allocated to each file/ teacher; once more, the same ID numbers as in the above paper questionnaires and observations were used in this analysis in order to ensure consistency of ID's and to comply with the confidentiality and anonymity regulations.

(ii) In this phase, the researcher also decided to transcribe individual teachers' observations (loud thinking) in order to avoid loss of important data. This included the explanations or comments made by individual teachers during their interaction with the revised search tool (PoSTech). Moreover, in the transcripts, the words 'Faezeh' (the interviewer) or e.g. 'Teacher 1' (the interviewee) was printed on the left-hand side of quotations, in order to distinguish between the sayings of the researcher and that of the teachers, (appendix VII; section G).

In this case study, sayings of individual teachers (video recordings) was transcribed 'word-by-word', which is considered to be the most common method. According to Rapley (2007, page 52);

> "The most common option is to offer some form of *verbatim transcript*, where you try to document the words that were spoken alongside who spoke them."

Furthermore, 'frequent repetitions' and writing words such as 'em'-s, and 'oh-s', together with using three of Jefferson's (2004) transcribing conventions; (1) Punctuation markers, (2) empty parentheses and (3) double parentheses, were also taken into consideration when transcribing video recordings, in this case study. In this case study, a number of symbols were used to better describe the transcripts.

- Punctuation markers (.,?) was used to show "the usual intonation", such as the comma and the question-mark (Jefferson, 2004, page 27).
- Empty parentheses '()' was used to show that the transcriber was unable to get what was said. The length of the parenthesized space reflected the length of the "un-gotten talk" (Jefferson, 2004, page 31). In this case study, the researcher decided to use empty parentheses in order to represent each un-gotten word rather than writing down the length (video time) of the un-gotten talk, since the individual teachers' interviews were recorded by the researcher's laptop (using built in speakers) and the quality of sounds was not guaranteed at all times. And,
- double parentheses '(( ))' were used to indicate the "transcriber's ['best'] descriptions [hearing]" (Jefferson, 2004, page 31).

In this case study, other symbols such as 'Pauses' (silences), 'overlapping speech', emphasis in intonation like 'sound-stretching' and emotional expressions that is 'laughter', 'coughing' and 'sighing' (Kvale, 2007; Rapley, 2007), were not used when transcribing the video recordings of teachers. Since, the addition of the above transcription details was not going to help the researcher to further learn about the online searching practices and use of search options of teachers. Additionally, the researcher printed and read through each of the 30 transcripts a number of times, in order to get herself familiarised with the data (appendix H).

The research read the 30 transcripts, once more and coded data accordingly. The researcher identified and coded the sayings of individual teachers about their online searching practices, needs and preferences. In total, ninety seven codes were generated (appendix VII; section E).

> "Once the researcher has read and digest the entire document, it is time to 'go to work on the data', so to speak." (Corbin and Strauss, 1996, page 163)

Re-occurring topics or issues were hand-coded in each transcript and was then listed in a separate page, respectively. In this list, each re-occurring topic was linked to the ID or number of the individual teachers, which enabled the researcher to know exactly who and how many of the teachers said (or raised) the same issue in the case study (appendix VII; section E). Therefore, a coding system was used here which aides handling of data for analysis, as stated by Kvale (2007, page 99):

> "By coding, the researcher first reads through the transcripts and codes relevant passages; then with the aid of code-and-retrieve programs the coded passages can be retrieved and inspected over again, with options of recording and of combining codes."

With this system, codes were grouped under nine separate headings; (1) "problems/suggestions with the search tools, interface design and search options"; (2) "teachers stating their view about the advantages and disadvantage of using the revised search tool"; (3) "information/online resources – teachers' usage of search results"; (4) "problems with online searching, as described by teachers"; (5) "about teachers' search engine training"; (6) "teachers' condition for recommending the revised search tool to their colleagues"; (7) "teachers' perception about search engines and online resources"; (8) "teachers' suggestions for the type of end-user the search tool should have or target"; and, (9) "teachers' opinion about usefulness of the revised search tool" (appendix VII; section E).

In this case study, interview transcripts were not sent to teachers for confirmation, as individual teachers were working on fixed schedules and often had little time outside their classroom teaching to give and or send their feedback.

Finally, using the above information, several draft reports were prepared that described and discussed the online searching practices of individual teachers within the context of the research questions proposed in this thesis. However, the researcher

did consult two qualitative experts at the Institute of Education (IoE) on several occasions that resulted in further modifications and re-groupings of categories/themes (Appendix VII).

In this chapter, the researcher has described her research design and selected methodologies for tackling the research problem proposed in this thesis. Moreover, it is important to re-iterate that in this thesis, the researcher will not be investigating individual teachers' online search results nor does she intend to make special claims about the design of search tool (PoSTech). Lastly, the first and revised search tool was mainly used as another research instrument to communicate with individual teachers about the kind of search options and features they use and prefer to have when searching online for teaching resources.

In the following chapter of this thesis, findings from structured paper questionnaires in phases one and four of the 1st round of the case study are outlined together with design details of the first and the revised (second) search tool.

Chapter 5

Evaluation of the first search tool: results from two structured questionnaires (paper and online form)

In this chapter, results from the structured questionnaires (paper-based and online form) obtained in phases one and four of the 1st round of the case study are described to address the research problem outlined in this thesis. Moreover, the design and development of the search tools in the 1st and 2nd round of the iterative case study is outlined.

5.1 Overview

In this chapter, the data obtained from the two structured questionnaires, completed in phases one and four of the 1st round of the case study, are analysed (figure 3).

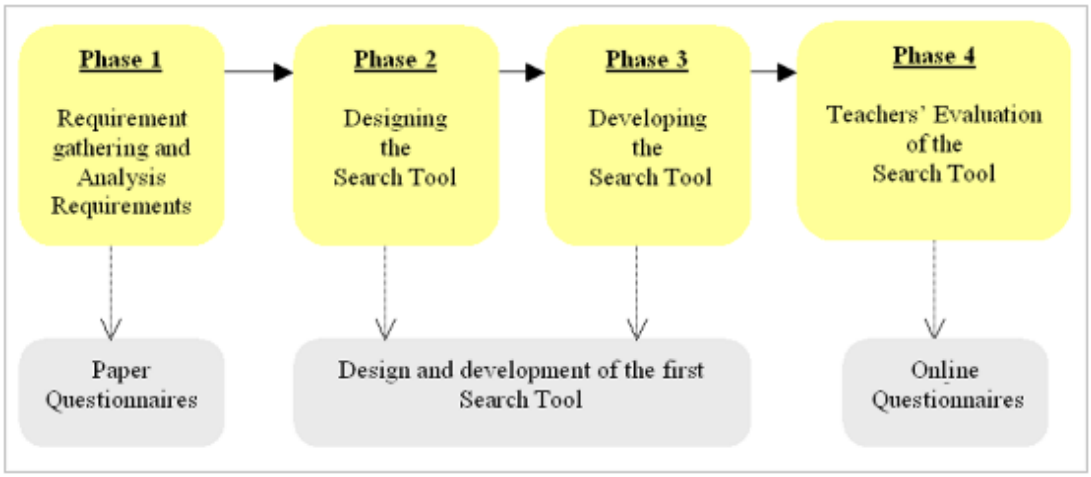


Figure 3 Phases one to four of the 1st round of the case study and its related activities to sections in chapter 5.

Hence, data obtained from the thirty paper questionnaires and the fifteen questionnaires (answered an online form) as well as the design and development of the search tools in the 1st and 2nd round of the case study are described in the following sections of this chapter.

Structure of the chapter

In this chapter, (1) the nature of the data obtained from the *thirty paper questionnaires* in phase one of the 1st round of the case study is discussed and analysed; (2) the *design and development of the first search tool* in phases two and three of the case study is described; (3) findings obtained from the *fifteen online questionnaire forms* in the phase four are also discussed and, finally, (4) the *design and development of the revised (second) search tool* in phases two and three of the 2nd round of the case study is depicted, using screenshots, for further analysis.

5.2 Phase one of the 1st round of the case study: paper questionnaires

To learn about individual teachers' search practices for online teaching resources, current use of search engines and their ideal search features, a total of thirty teachers were asked to complete the paper questionnaire. This questionnaire was prepared in phase one of the 1st round of the case study that is 'Requirement gathering and Analysis' (figure 3 and appendix II).

The paper questionnaire, discussed above, was completed by 10 male and 20 female teachers whose teaching experiences ranged from 1 to 20 years (the majority of teachers had between 1 to 6 years of teaching experience).

The thirty teachers involved in this survey consisted of ten primary, secondary and post-compulsory teacher practitioners in the UK educational settings, respectively. Subjects taught by individual teachers included 'Arts & Design', 'English', 'English with Drama', 'Geography', 'History', 'ICT', 'Mathematics', 'Modern Foreign Languages', 'Music', 'Science', 'Social Science' (psychology and sociology) and 'Generic'. In this questionnaire two teachers selected the option 'Other' ('Early Years') and one teacher did not select her taught subject, which was later classified as being 'missing data'.

In this study individual teachers' demographic data were captured in questions one to four of the paper questionnaire. Full data relating to this section is provided in appendix VII; section A.

5.2.1 Data obtained from paper questionnaires

In this section, results obtained from the thirty paper questionnaires are discussed. The data described in this section relates to answers of individual teachers to the questionnaires, that is questions five to eighteen.

- **Teachers' use of online resources (questions 5 & 6)**

In question number 5, teachers were asked whether they look for online resources. In this question teachers could select either 'Yes' or 'No'.
Results showed that individual teachers do search for online resources as all of the 30 teachers answered 'Yes' to looking for teaching materials online.

- **Teachers' most liked search features (question 7)**

In question number 7, teachers were asked to state their reason/s for using a particular search engine. Findings from this question showed that individual teachers' most liked search features is to have variety of 'free' online resources or ideas that are drawn from other teachers, educational and or academic websites. The following quotations represent the data obtained from this question:

> "Getting ideas from other teachers and sources for subject areas" (Teacher 3).
> "You can get a variety of pictures, simulations and other interactive media at no cost" (Teacher 18).
> "Allow access to different levels of competency/difficulty of the key concepts I need to introduce" (Teacher 27).

- **Unpopular search features (question 8)**

In question number 8, teachers were asked to select their disliked online searching features. Results from this question shows that individual teachers have serious concerns about search engines' performance and functionality as evidenced by their identification of problems such as 'irrelevant information', 'poor quality of resources', 'wasting time' (through web navigation) and indeed 'compulsory registration' (level of web personalisation) and 'payment'. The following quotations represent the data obtained from this question:

> "Finding relevant info can be hard. Always have to adapt material to suit the purpose" (Teacher 1).
> "Links that are expired!; Links that need to be registered for; links that require a registration free" (Teacher 24).
> "Sitting through useless information" (Teacher 25).

- **Frequency of teachers' usage of search services (question 9)**

In question number 9, teachers were asked to select their usage of online search services. The following table represents the data obtained from this question:

How often do you search for teaching materials online?	**Number of times teachers selected an option (n=30)**
Always	7
Once a day	4
Once a Week	11
Once a Month	-
Every Three-Month	1
Occasionally	7
Never	-

Table 7 The online search of teachers for teaching materials.

Findings from the above table shows that the majority of teachers do search online for resources, as twenty two of the selections made by individual teachers' was 'Always', 'Once a day' or 'Once a Week' (table 7).

- **Rating teachers' search success (question 10)**

In question number 10, teachers were asked to select their individual success rate of finding relevant and/ useful online materials. The following table represents the data obtained from this question:

When you search online on average how often do you find the materials you were looking for?	Number of times teachers selected an option (n=30)
Always	-
Most of the time	15
Sometimes	15
Never/Rarely	-
Don't Know	-

Table 8 The search success ratings of teachers finding their useful online resources.

Findings from the above table show that individual teachers in this study are indeed unable to 'Always' find useful/relevant online resources (table 8).

- **Teachers' search for multimedia (question 11)**

In question number 11, teachers were asked to select the type/s of multimedia they searched for online. For ease of analysis, option 'All' was added to the relevant sections (Images, MP3/Audio and Video) and thus removed from the table.

In this question, teachers were given the option of selecting one or more search engines. Therefore, the resulting output exceeded 30 (where the teachers' sample size 10 male and 20 females) as each teacher was allowed to make one or more selections. The following table represents the data obtained from this question:

What type of multimedia do you look for? (you may tick more than one box)	Number of times teachers selected an option (n=30)
Text	
Text	26
Other	4
Images	
Photos	24
Graphics	20
Tables	11
Diagrams	19
Other	2
None	-
Don't know	-
MP3/Audio	
MP3	1
WAV	-
Real	1
AIFF	-
Windows Media	4
Other	-
None	19
Don't Know	4
Video	
MPEG	3
AVI	-
Quick Time	9
Real	5
Other	-
None	16
Don't Know	1

Table 9 The individual teachers search for multimedia type(s)

Findings from the above table shows that the majority of teachers selected multimedia type 'Text', 'Photos', 'Graphics' and 'Diagrams'. Moreover, more than half of the teachers selected option 'None' for multimedia types 'MP3/Audio' and 'Video'. Teachers' responses in this question may have been related to the way the question was designed i.e. using abbreviations rather than the full names of some multimedia options; multimedia types listed under this particular question was adopted from secondary source and the full meaning of the abbreviated words was not stated. For example, multimedia types 'WAV' (Waveform Audio Format), 'AIFF' (Audio Interchange File Format) or 'AVI' (Audio Video Interchange) were listed as 'WAV', 'AIFF' and AVI' (table 9). However, having said that, users of

such multimedia would have been familiar with the abbreviated names if they had used them.

- **Teacher's choice of search engine (question 12)**

In question number 12, teachers were asked to select the names of search engine(s) they used. The teachers were given the option of selecting one or more search engines (table 10). Therefore, the resulting output exceeded 30 (where the teachers' sample size 10 male and 20 females) as each teacher was allowed to make one or more selections. The following table represents the data obtained from this question:

Which search engine do you use? (you may tick more than one box)	Number of times teachers selected an option (n=30)
Google	30
Yahoo	12
Ask Jeeves	7
AOL	3
MSN	3
Lycos	2
Netscape	1
AllTheWeb	1
LookSmart	1
InfoSpace	1
Dogpile	1

Table 10 The individual teachers usage of search engines.

Findings from the above table show that all teachers selected the search engine Google. Moreover, Yahoo was selected by less than half of the teachers (table 10).

- **Reasons given by teachers for using a particular search engine (question 13)**

In question number 13, teachers were asked to select their reasons for using search engines. Teachers were given the option of selecting one or more reasons (table 11). Therefore, the resulting output exceeded 30 (where the teachers' sample size 10 male and 20 females) as each teacher was allowed to make one or more selections. The following table represents the data obtained from this question:

Why do you choose a search engine? (you may tick more than one box)	Number of times teachers selected an option (n=30)
Just out of habit	21
User friendly	11
Speed of access	9
Accuracy of data	7
Size of repository	5
I like the web page icons	2
Other, Please specify	-

Table 11 Reasons given by teachers for using a particular search engine.

Findings from the above table show that the majority of teachers selected the option 'Just out of habit'. Less than half of teachers selected options 'User friendly' and 'Speed of access'. Furthermore, individual teachers selected options 'Accuracy of data' and 'Size of repository' the least number of times (table 11).

- **Teachers' problems with existing search services (question 14)**

In question number 14, teachers were asked to select their disliked online searching features. The teachers were given the option of selecting one or more features (table 12). Therefore, the resulting output exceeded 30 (where the teachers' sample size 10 male and 20 females) as each teacher was allowed to make one or more selections. The following table represents the data obtained from this question:

What problems do you encounter with existing search engines? (you may tick more than one box)	Number of times teachers selected an option (n=30)
Too much returned information	15
The returned links are out of date	12
Little or no information on what the links are	8
No information on the required topic	7
No clear explanation of the search results	6
The search instructions are not clear	3
Other, Please specify	2
Too slow	-

Table 12 The search problems of current search engines faced by teachers. The data represents the number of teachers selecting their disliked online searching features.

Findings from the above table show that half of the teachers selected the option 'Too much returned information'. Less than half of the individual teachers selected search options 'The returned links are out of date' (table 12).

Moreover, individual teachers selected search options 'No clear explanation of the search results' and 'The search instructions are not clear' the least number of times. Below are quotations extracted from teachers' paper questionnaires:

> "Some things are too advanced for what I need" (Teacher 16).
> "1. Search engines do not store many dynamically generated page, 2. They cannot access password restricted pages e.g. from Journals" (Teacher 23).

Finally, two teachers ticked the 'Other' option, by referring to relevancy of their returned search results. Below are quotations extracted from teachers 4 and 24's paper questionnaires:

> "not specific enough[; it] relate to American sites – not relevant" (Teacher 4).
> "Search made on individual words rather than a sentence" (Teacher 24).

- **Teachers' usage of online resources (question 15)**

In question number 15, teachers were asked to select which curriculum website/search engine they use. The teachers were given the option of selecting one or more curriculum websites/search engines (table 13). Therefore, the resulting output exceeded 30 (where the teachers' sample size consisted of 10 male and 20 females) as each teacher was allowed to make one or more selections and table 13 represents the data obtained from this question.

Which one of these Curriculum Resources do you use? (you may tick more than one box)	Number of times teachers selected an option (n=30)
Free Lesson Plans, Web Quests, Worksheets and Teacher Tools!	7
None	7
Curriculum Ideas	5
Other, Please specify	5
Educational Resources	4
Teacher Resource	4
Teachernet.gov.uk	4
Scholastic.com	1
Theme Pages for Elementary Students and Teachers	1
Sitesforteachers.com	1
Bablefish (translates text from one language to another!)	1
Graphic Organizer downloads	1
Making a Template on a PC	1
Learning wales.gov.uk	-
Ask ERIC	-
SCORE	-
Graphic Organizers (Adobe Acrobat printable pages!)	-
Blue Web'n	-
Kathy Schrock Home page	-
Tech Trekers.com	-
Edhelper.com	-
Franklin Institute Hot List by Subjects AllTheWeb	-
Awesome Library	-
Bigchalk.com (data base for lesson plans)	-
Curriculum Integration	-
Houghton Mifflin	-
Apple Learning Interchange	-
Atomic Learning	-
Becoming Human	-
TeachersFirst.com	-
The Teacher's Internet Use Guide designing Lessons	-
EverythingESL.net	-
Making a Template on a Mac	-
Visual Manipulative	-
Assemblies	-

Table 13 The curriculum online resources or related search engine usages of teachers.

Findings from the above table shows that few of the individual teachers selected curriculum websites or related search engines that were listed in this question. For example, few of the individual teachers selected the option 'Free Lesson Plans, Web

Quests, Worksheets and Teacher Tools!'. Individual teachers' explanation for using these particular websites related to the variety of online resources, ease of access and or familiarity:

> "[...] [Teachernet.gov.uk, gives] Great ideas, worksheets etc." (Teacher 3).
> "[Teachernet.gov.uk] is the only one I was made aware of" (Teacher 15).
> "they [Teacher resource, Free lesson plans, Bablefish,Teacher.gov.uk] come up during searches" (Teacher 16).
> "Did not know many of them existed" (Teacher 17).

Moreover, five teachers were found not to have answered or selected any option in this question, with five other teachers selecting the option 'Other', adding the following websites and/ comments:

> "Hamilton, Primary resources [in order to look] "-> for lesson plans. -> Games" (Teacher 7).
> "enchanted learning" (Teacher 8).
> "www.spasheus.com , www.schoolshistory.co.uk" (Teacher 14).
> "Teachit.co.uk [it] Provides a number of useful and innovative resources created by English teachers. The resources are in Word and so are adaptable" (Teacher 26).
> "Activehistory.co.uk, Schoolhistory.co.uk [it gives] Relevant resources for topics being taught. Can save time and provide some activities which are appropriate as starters" (Teacher 27).

Consequently, given the small number of selections made by individual teachers, it was not possible to draw a definite conclusion for this question.

- **Teachers' preferred searching criterion (question 16)**

In question number 16, individual teachers were asked to select their most important online search criteria. The teachers were given the option of selecting one or more online search criteria (table 14). Therefore, the resulting output exceeded 30 (where the teachers' sample size consisted of 10 male and 20 females) as each teacher was allowed to make one or more selections and table 14 represents the data obtained from this question.

What criteria do you consider to be very important when you search online for teaching materials? (you may tick more than one box)	Number of times teachers selected an option (n=30)
The topic you want to teach	26
Your objective	22
Your students' age group/level	20
The task you are going to do i.e. poster design, handouts, class exercise	14
The syllabus you are teaching	11
The time allocated/allowed for your teaching	3
Other, Please specify	1

Table 14 The most important criterion used by teachers for online searching.

Findings from the above table shows that the majority of teachers selected options 'The topic you want to teach', 'Your objective' and 'Your students' age group/level'. Moreover, almost half of teachers selected options 'The task you are going to do i.e. poster design, handouts, class exercise' and less than half selected 'The syllabus you are teaching' (table 14).

- **Online resources usages of teachers (question 17)**

In question number 17, individual teachers were asked to select the different ways in which they used online resources. The teachers were given the option of selecting one or more method (table 15). This allowed the resulting output to exceed 30 (where the teachers' sample size consisted of 10 male and 20 females) as each teacher was allowed to make one or more selections. The following table represents the data obtained from this question:

What do you do when you have located/found your desired material? (you may tick more than one box)	Number of times teachers selected an option (n=30)
Incorporate it into your own materials	23
Add it to a word document	18
Give it to your students as a handout	12
Add it to a PowerPoint presentation	11
Show it to your students	6
Add to OHT (Over Head Transparency) slides	4
Place it on your resource site (upload it to your website)	3
Other, Please specify	2
Add it to your poster presentation/wall poster/class poster	1
Don't Know	-
Add it in the class/school Newsletter	-

Table 15 The different ways online resources are used by individual teachers.

Findings from table 15 shows that the majority of teachers selected the option 'Incorporate it into your own materials'. More than half of the teachers selected the option 'Add it to a word document' (table 15).

Less than half of the individual teachers selected options 'Give it to your students as a handout' and 'Add it to a PowerPoint presentation'. Moreover, options 'Add to OHT (Over Head Transparency) slides' and 'Add it to your poster presentation/wall poster/class poster' were selected the least by number of times (table 15).

Finally, two teachers (teachers 8 and 12) selected the option 'Other'; teacher 8 explained that she would access her selected online materials directly from the internet (URL address) and teacher 12 said he would print and or copy it. Hence, these answers were added to options 'Show it to your students' and 'Incorporate it in to your own materials' respectively.

- **The ideal search service of teachers (question 18)**

In question number 18 teachers were asked to state characteristics and or features of their ideal search services/engine.

Individual teachers' ideal search engine was described as one where search results matched their 'curriculum' (age and/year), 'specification', 'topic' and student's 'learning abilities'. For example, teachers were in support of the following search engine features:

> "Provide lessons ideas relevant to the necessary topic" (Teacher 1).
> "A search engine that is curriculum based so that results are narrowed and focused and relevant for the age phase" (Teacher 2).
> "Allow access to different levels of competency/difficulty of their key concept I need to introduce" (Teacher 22).
> "Focus on your specific syllabus and specification. Focus on age group you are teaching. Provide access to printable and adaptable resources" (Teacher 26).

Individual teachers also highlighted the importance of finding up-to-date and relevant resources with downloading and printing facilities such as 'lesson plans', 'worksheets' and 'multimedia'. The following quotations represent the data obtained from this question.

> "Printable worksheets, learning interactions, lesson plans, cross-curricula links" (Teacher 5).
> "Filter sites without educational content. Search for resources by topic and type i.e. image, worksheet, simulation, movie clip, game. ICT activity, spreadsheet etc" (Teacher 18).

Teachers also explained that they would like search engines to incorporate search features and or editing facilities such as the ability to store (save previous search result/s), edit, copy, and paste their selected (relevant) online resources. The following quotations represent the data obtained from this question:

> "[…] [To] be able to store them [resources and], put a tap on it" (Teacher 10).
> "[…] Easy to copy, paste, change" (Teacher 19).
> "It records my profile: to present search results in what i am teaching and which KS. It remembers searchers I have made; It will 'volunteer' to save chosen sites into an organised storage" (Teacher 14).

Finally, individual teachers wanted to have search options that can filter their search results according to resources types, educational websites and access means ('free' or 'paid'). The following quotations represent the data obtained from this question:

> "[…] Differentiate between free resources and those you have to pay for. Provide researchers sites for student projects" (Teacher 18).
> "Free, downloadable, doc, pdf, pp files to use as resources, well organised and navigable" (Teacher 28).

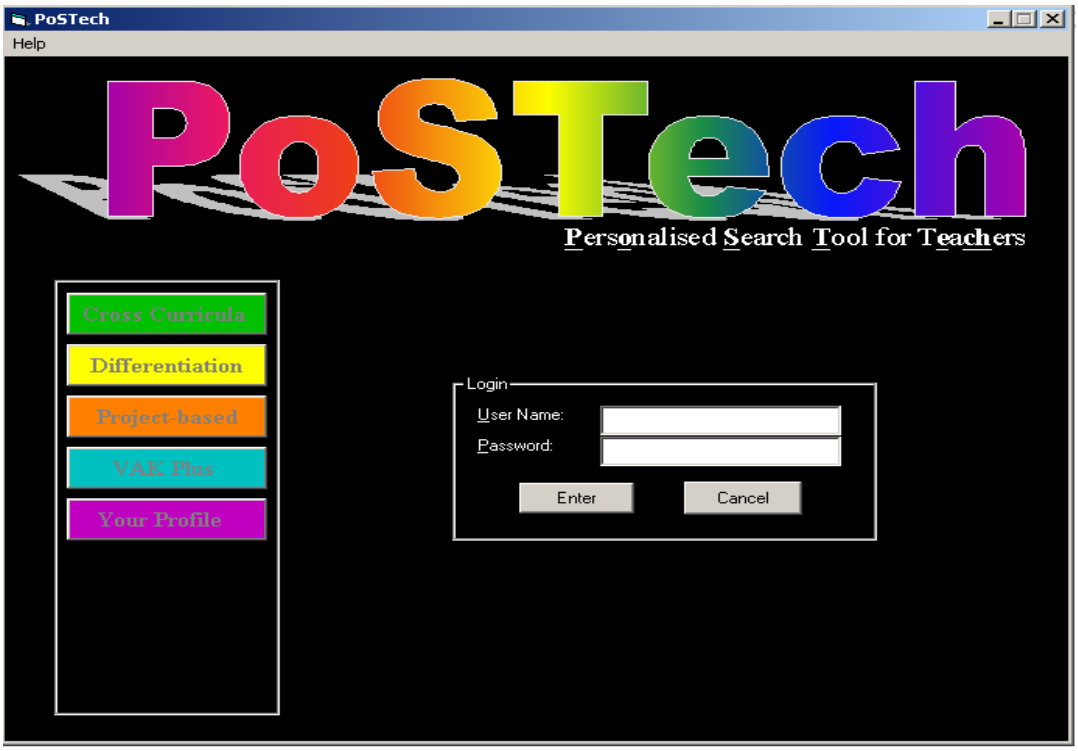
5.3 Design & development of the first search tool

In this section the design and development of the first search tool (phases two and three) that was used in the 1st round of the case study is described (chapter 4 – figure 2).

The design of the first search tool was guided by the results obtained from the paper questionnaires described earlier in this chapter; individual teachers' selections of options together with their comments and/ suggestions were used to create a system specification or system requirements for the first search tool. The search tool's system specification contained seventeen categories (appendix VIII; section A).

To arrange these seventeen categories into the design of the first search tool, five separate headings titled as 'Cross-Curricula', 'Differentiation', 'Project-Based',

'VAK Plus' and 'Profile' were created; titles were simply used to group categories for interface designing and coding (screenshot 1). Moreover, as a result of this categorisation, some items were repeated i.e. 'Subject' and 'Topic in mind'. Full system specification and step-by-step screenshots of the software is available in appendix (appendix VIII; sections A and C).



Screenshot 1 The first search tool called 'Personalised Search Tool for Teachers' (PoSTech).

The term *Cross-curricular* (also known as interdisciplinary) refers to a situation where a single topic e.g. "World War II" is collectively selected by primary teachers in the school and then used as a guideline to plan and prepare their individual lesson plans across the whole national curriculum, with the aim of achieving the national standards set by the government; to teach all subjects in the national curriculum like English, Mathematics, Science, Information Technology (IT), History, Geography, Music and Art around their selected topic i.e. "World War II" (Seyedarabi and Monthienvichienchai, 2005).

Moreover, the term *differentiation* is defined by Petty (2004, page 1) as "[...] an approach to teaching that attempts to ensure that all students learn well, despite their

many differences", i.e. 'Gifted' or 'Talented' students, 'Special Educational Need (SEN)' students or 'English as Second Language (ESL)' students. The term *project-based* learning (abbreviated to PBL) is defined by Moylan (2008, page 287) as;

> "[...] a systematic teaching method that engages students in learning essential knowledge and life-enhancing skills through an extended, student-influenced inquiry process structured around complex, authentic questions and carefully designed products and task."

Finally, the term *VAK* is derived from the learning style that uses the three main sensory receivers, i.e. Visual, Auditory and Kinaesthetic as highlighted by Clark (2000, n.p), (Clark, 2000, n.p),

> "According to the VAK theorists, we need to present information using all three styles. This allows all learners the opportunity to become involved, no matter what their preferred style may be."

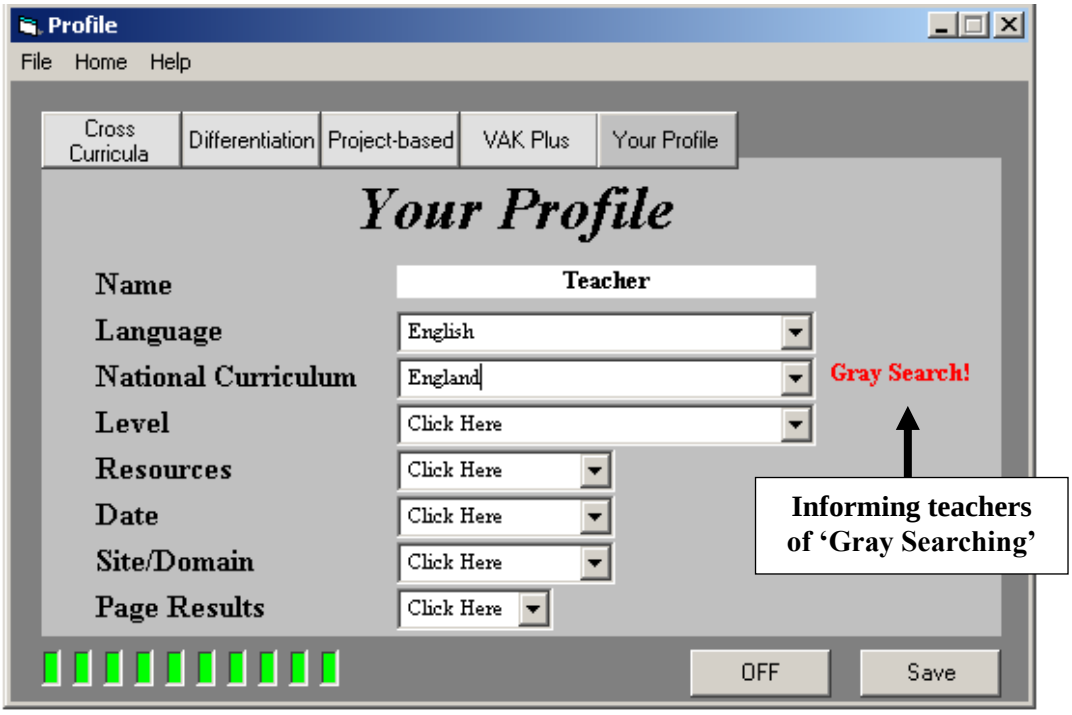
In this case study, the heading 'VAK Plus' was used to group online resources such as multimedia objects, maps and news. This particular abbreviation (VAK) is often seen in teachers' lesson plans, which was also informed by the researcher's work on learning style (Seyedarabi and Monthienvichienchai, 2005). The word 'Plus' was added to include other types of resources requested by teachers e.g. lesson plans (appendix VIII; section B), for this reason the term 'Plus' was only used to group individual teachers' search keywords and was not intended to develop or invent a new terminology.

The remaining headings ('Cross-Curricula', 'Differentiation' and 'Project-Based') were selected based on findings obtained from question number 18 and findings from previous reseaches e.g. (iClass, 2005). The heading 'profile' was adapted to capture individual teachers' recommended search features in question number 18, e.g. teaching 'Level' and indeed other advanced search features like search results 'Language' and 'Date' (screenshot 2). As a second example, teacher 14's recommended search engine feature was described as follows:

> "It [can] records my profile: to present search results in what i am teaching and which KS." (Teacher 14).

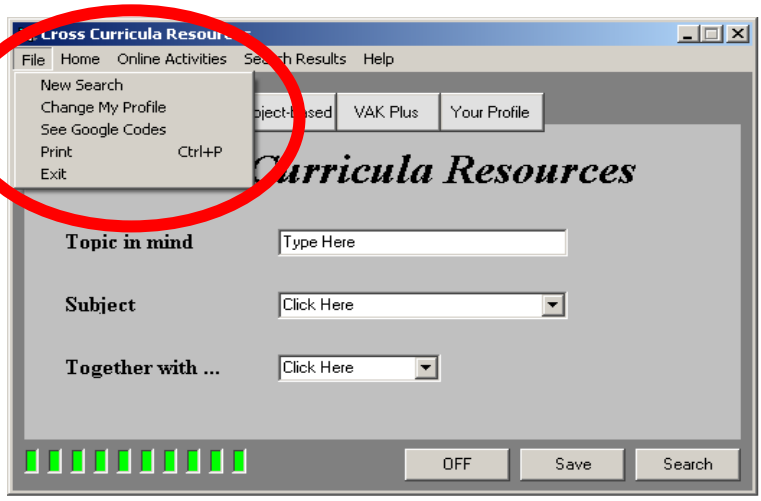
To inform teachers about the search tool's technical (programming) limitations, the phrase 'Gray Search!' was made visible upon individual teachers' selection of such

items, e.g. 'National Curriculum' (screenshot 2). This phrase therefore highlighted the researcher's inability to match teachers' selected search options (the search tool's limitations) with Google's searching language/code; when retrieving their search results from Google's repository or search engine (screenshot 2 and appendix VIII; section C).



Screenshot 2 Informing Teachers of 'Gray Search'

A toolbar menu was also designed for this search tool. This menu consisted of twelve extra search features such as 'Help', 'See Google Codes', 'Print', 'Exit', 'Show Only 10 Matches' and 'What is 'Gray Search'?' (screenshot 3 and appendix VIII; section D).

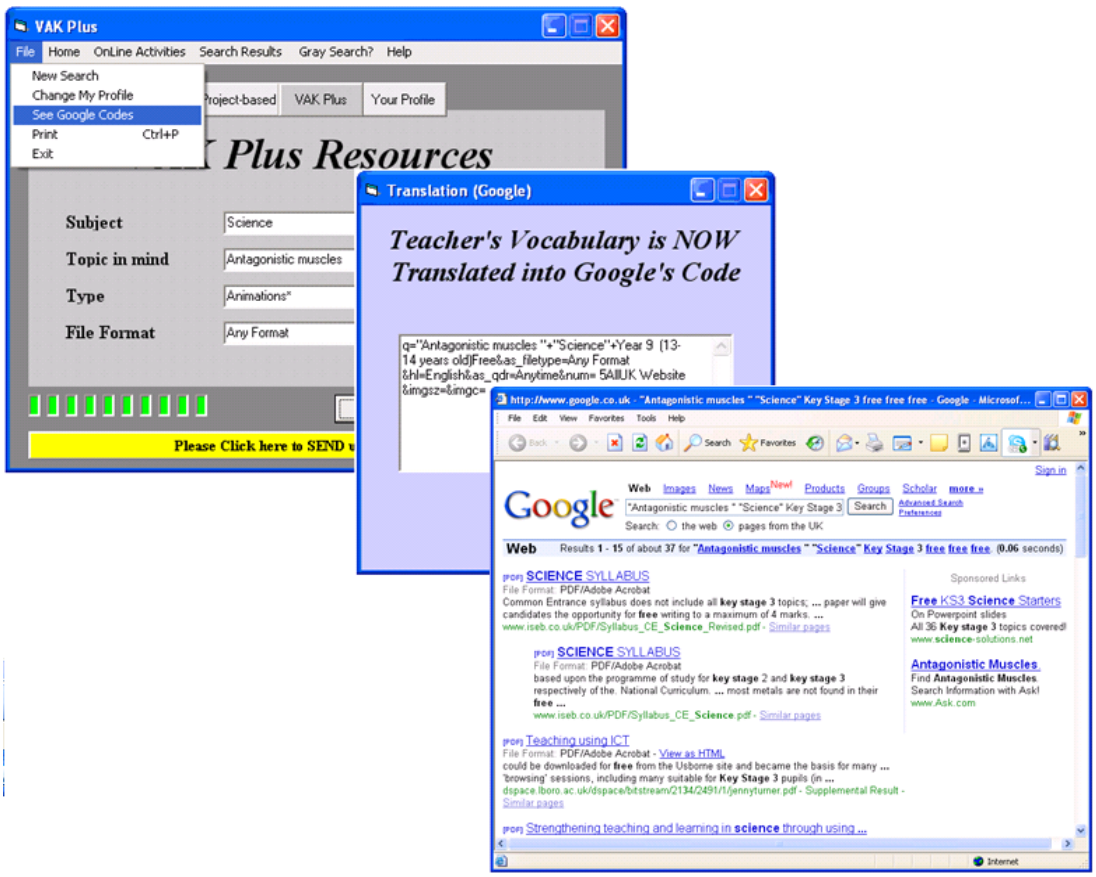


Screenshot 3 Options available under the 'File' menu

5.3.1 Search tool development

To create an impression of a possible personalised search tool, teachers' queries (typed keywords and selected search options) were retrieved from the Google's repository or search engine. The Google search engine or repository was selected for the retrieval of individual teachers' search results, as it was the most popular search engine selected by individual teachers studied in this case study (described earlier) and indeed by internet users in general (Hoover, 2007).

Hence, the first search tool was designed to collect and merge individual teachers' selected criterion into a single query that was sent automatically to the Google search engine to retrieve teachers' search results (screenshot 4).



Screenshot 4 **Retrieving individual teachers' search results from the first search tool ('VAK Plus' category) using Google search engine/repository.**

Furthermore, to aid individual teachers construct the correct understanding about the use of the first search tool, teachers were given the opportunity to learn Google's

searching language (Seyedarabi, 2008); this option was made available under the 'Help' toolbar (appendix VIII; section C).

As a final remark, it is however important to reiterate that in this case study individual teachers' search results, e.g. number of pages viewed, links clicked and quality of online resources will not be investigated nor discussed as the focus of the iterative case study is to investigate the potential value of personalised web searches, i.e. the extent to which web personalisation enhances teachers' internet searching for resources and NOT personalisation of their search results.

5.4 Findings from the online questionnaire forms

In this section, findings obtained from the online questionnaire forms that was completed by fifteen teacher practitioners in phase four ('Teachers' Evaluation of the Search Tool') of the 1st round of the case study are discussed. Individual teachers were asked to complete an online form that was embedded into the first search tool in a form of a URL link (appendix III; section B and appendix VIII; section G).

The online questionnaire, discussed above, was completed by 8 'Male' and 7 'Female' teachers whose teaching experiences were ranged from 1 to 36 years; the majority of teachers had between 1 to 5 years of teaching experience. Subjects taught by individual teacher consisted of 'Arts & Design', 'English', 'History', 'ICT', 'Mathematics', 'Music', 'Religious Education' and 'Science'.

The following sections of this chapter will discuss the data obtained from questions five to thirteen of the online questionnaire forms; individual teachers' demographic data were captured in questions one to four of the online forms. Full data relating to this section is provided in appendix VII; section B.

- **Online resources usages of teachers (questions 5 & 6)**

In question number 5, teachers were asked if they looked for online resources. In this question teachers could select either 'Yes' or 'No'.

Results from the responses to this question showed that individual teachers do search for online resources as all 15 teachers answered 'Yes' to looking for teaching materials online.

- **Search keyword(s) typed by teachers in the first search tool (question 7)**

In question number 7, teachers were asked to provide their typed query by copying and pasting their keywords from the first search tool onto the online questionnaire form, which was the allocated answer field for question number 7.

Results from this question showed that individual teachers' method of query construction in the first search tool was primarily to combine keywords related to teachers' subjects or topics with infrequent use of Boolean operators i.e. 'AND', 'OR', 'AND NOT' and 'modifiers'.

- **The search categories used by teachers in the first search tool (questions 8)**

In question number 8, teachers were asked about their selected search category in the first search tool. The following table represents the data obtained from this question:

Which search option did you select?	Number of times teachers selected an option (n=15)
Cross Curricula	2
Differentiation	1
Project-based	2
VAK Plus	10

Table 16 Search categories selected by teachers in the first search tool.

Findings from the above table show that the majority of individual teachers selected the search category 'VAK Plus' in the first search tool (table 16).

- **Reaction of individual teachers to the first search tool (questions 9)**

In question number 9, teachers were asked to select their opinion of searching online when using the first search tool. The following table represents the data obtained from this question:

Did you like the Search Tool (PoSTech)?	Number of times teachers selected an option (n=15)
Yes	5
No	10

Table 17 The opinion of individual teachers about the first search tool.

Findings from the above table show that the majority of individual teachers did not like to use the first search tool (table 17).

- **The opinion of individual teachers about the first search tool's interface (questions 10)**

In question number 10, teachers were asked to select their opinion about the first search tool's interface design by selecting answer 'Yes' or 'No'.

Finding from this question showed that the majority of teachers in this case study disliked the first search tool's interface design, as more than half of teachers (9 teachers out of 15) selected the option 'No'.

- **The most liked categories by teachers in the first search tool (questions 11)**

In question number 11, individual teachers were asked about their opinion of search categories in the first search tool. Findings from this question showed that almost half of the individual teachers (8 teachers out of 15) liked the concept ('look' and 'feel') of search categories in the first search tool. The following quotations represent the data obtained from this question:

> "The potential to look for teaching material" (Teacher 10).
> "the fact that it is personalised to me as it recognises me when I sign in" (Teacher 14).
> "Potentially easy to use if the 4 headings were anything to do with my normal search criteria" (Teacher 6).

Furthermore, nearly half of teachers (7 teachers out of 15) disliked the heading used for the four categories (Cross Curricula, Differentiation, Project-based and VAK Plus) in the first search tool. The following quotations represent the data obtained from this question:

> "Not sure what it was trying to achieve" (Teacher 9).
> "I didn't like anything about it" (Teacher 15).

- **The identification of problems and/faults of teachers in the first search tool (questions 12)**

In question number 12, teachers were asked about problems and/faults they encountered when using search categories in the first search tool. Findings from this

question showed that individual teachers were unable to understand all features and procedures of search categories in the first search tool and expressed their disappointment in not finding the relevant or useful resources. The following quotations represent the problems encountered:

> "all the extra categories seemed to stop Google finding useful sites" (Teacher 8).
> "The headings VAK project etc are not the sort of thing I would use as search terms" (Teacher 6).
> "I did not understand what the words 'gray search' in red meant" (Teacher 15).

Technical problems highlighted by individual teachers in this iterative case study included 'poor interface design', 'inappropriate use of error messages' and 'user access'. The quotations below represent the technical problems:

> "Too cluttered and therefore not user friendly for me" (Teacher 1).
> "error message saying "one or more category missing" when i press search button even though i didn't miss anything out. the interface needs to be better so that the user knows exactly what they are doing. it didn't give the results i needed" (Teacher 13).
> "Downloading and installing software was not desirable!" (Teacher 11).

Two teachers found 'no faults' with the first search tool. In this case study problems of 'access' was to do with asking individual teachers to download and install the first search tool (software) onto their computers.

- **Teachers' recommended features for the first search tool (questions 13)**

In question number 13, teachers were asked to suggest other searching features or characteristics for improving the first search tool.

Findings from this question showed that features recommended by individual teachers in this case study include having a simpler interface design and more flexibility. This would involve improving the first search tool's interface design by reducing and/ removing compulsory search options that were presented under the heading 'Profile' and adding one more subject area for teachers to select from. The quotations below represent the teachers' comments:

> "the profile insisted on having every box checked and these stopped Google finding some sites" (Teacher 8).
> "A menu for Dance/Performing Arts" (Teacher 10).
> "Something that find National Curriculum linked resources quickly" (Teacher 2).

The following two teachers asked for clarification on the functions and or features included in the first search tool:

> "the 4 headings are only good for looking for complete lesson plans but these are not very common" (Teacher 7).
> "more explanation of what each button is for. e.g. it would be nice if a box comes up explaining more briefly what each button is and what it can do for me" (Teacher 14).

Lastly, one teacher suggested having a 'voice recognition' system. However, this is not possible to implement in the search tool designed in this case study.

> "I did not find it much help" (Teacher 6).
> "Nothing" (Teacher 12).

It must be added that the notion of 'voice recognition' (a request made by one teacher) is currently being investigated by major search engines and in research laboratories. For example, the IBM's India Research Laboratory is exploring "…the possibilities of a 'spoken web', where users navigate around audio content using voice commends" (Becta, 2008, page 55).
Furthermore, inclusion of search features for "a menu for Dance/Performing Arts" and 'meta' searching or retrieving search results from "[…] multiple search engines at once", requested by teachers number 9 and 10 were considered to be outside the scope of this thesis.

5.4.1 The 2nd round of the case study

The results described in the previous section (individual teachers' answers to questions 5-13 of the online questionnaire forms) are summarised and then discussed in this section in order to decide the need for performing a second round of the case study.

Findings obtained from **questions numbers 5 and 6** showed that all the fifteen teachers studied in this case study do indeed search for online resources.

Findings from **question number 7** showed that teachers' queries were mainly constructed by using keywords related to their individual taught subject or topic, with infrequent use of Boolean operators and or modifiers.

Findings from **question number 8** showed that the majority of individual teachers used the search category 'VAK Plus' (section 5.4, table 16).

Findings from **questions numbers 9 and 10** showed that the majority of teachers disliked using the search categories and the interface design of the first search tool, when searching for online searching (section 5.4, table 15).

Findings from **question numbers 11** showed that individual teachers mostly liked the concept behind the four search categories in the first search tool but disliked the headings 'Cross curricula', 'Differentiation', 'Project-based' and 'VAK Plus'.

Findings from **question numbers 12** showed that problems associated with the design of search features in the first search tool was lack of clarification, inappropriate use of 'error messages' and 'user access'.

Findings from **question numbers 13** showed that individual teachers' recommendation for search features in the first search tool is to have flexibility and simplicity in the interface design.

Results from the above findings suggest that individual teachers do search for online teaching resources. Individual teachers' usage of a search tool is influenced by the interface design and searching categories; type of headings (titles) offered to web searchers and the search tool's error messages (pop-up massage box). Moreover, the options and features used by individual teachers in an online search tool is to have search options similar to the ones presented under the 'VAK Plus' category (described earlier in this chapter) using keyword searching and to have clear and useful instructions to follow.

Given the type of information found above, the researcher decided to carry out the 2nd round of the case study by repeating phases two to four of the System Development Life Cycle' (SDLC) methodology (chapter 4 – figure 2); repeating the case study will enable the researcher to rectify the first search tool's interface design, search options and features requested by individual teachers together with revising and or advancing her research instruments.

With this background information in mind, the design and development of the revised search tool will be described in the following section of this chapter.

5.5 The revised search tool in the 2nd round of the case study

In this section, the first search tool that was described earlier in section 5.3.1 of this chapter is revised and prepared for re-evaluation. Hence, system constrains identified by individual teachers are rectified according to responses received in phase four of the 1st round of the case study (figure 4).

Additionally, the information provided in this phase will *not* be used directly to answer the thesis's research question but will create a setting in which data can be generated to answer the question.

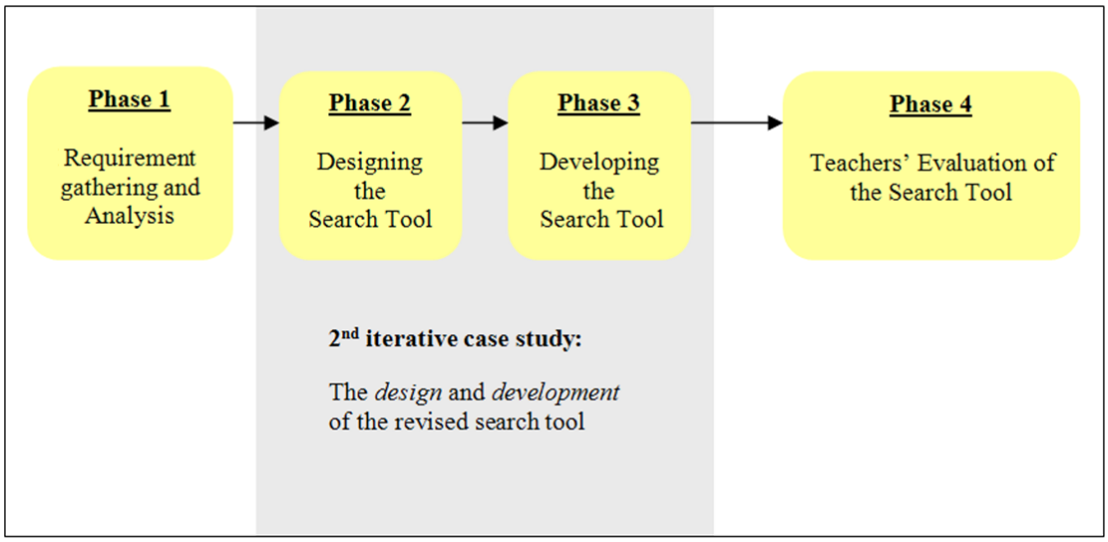


Figure 4 Design and development of the revised search tool in phases two and three of the 2nd round of the case study.

The design and development of the revised search tool are described in the following section using screenshots of the search tool.

5.5.1 The design and development of the revised search tool

Further to teachers' evaluation of the first search tool described earlier in this chapter, three main amendments were made to the search tool's system specification.

These included change of search engine or repository, page layout and re-wording of search options.

To improve and indeed expand existing search options, AltaVista's search engine codes was used instead of Google in order to execute teachers' queries, given that at the time of development Google did not allow as much control over queries compared to AltaVista (Poremsky 2004, page 64).
Consequently, by using the AltaVista's codes it was possible to further manipulate teachers' search queries, as AltaVista offers:

> "[…] full Boolean and case-sensitive searching, along with a variety of field-search and language options, to help you target your searches" (Poremsky, 2004, page 183).

The following changes were also made to the search tool's page layout and presentation of search options (wordings):

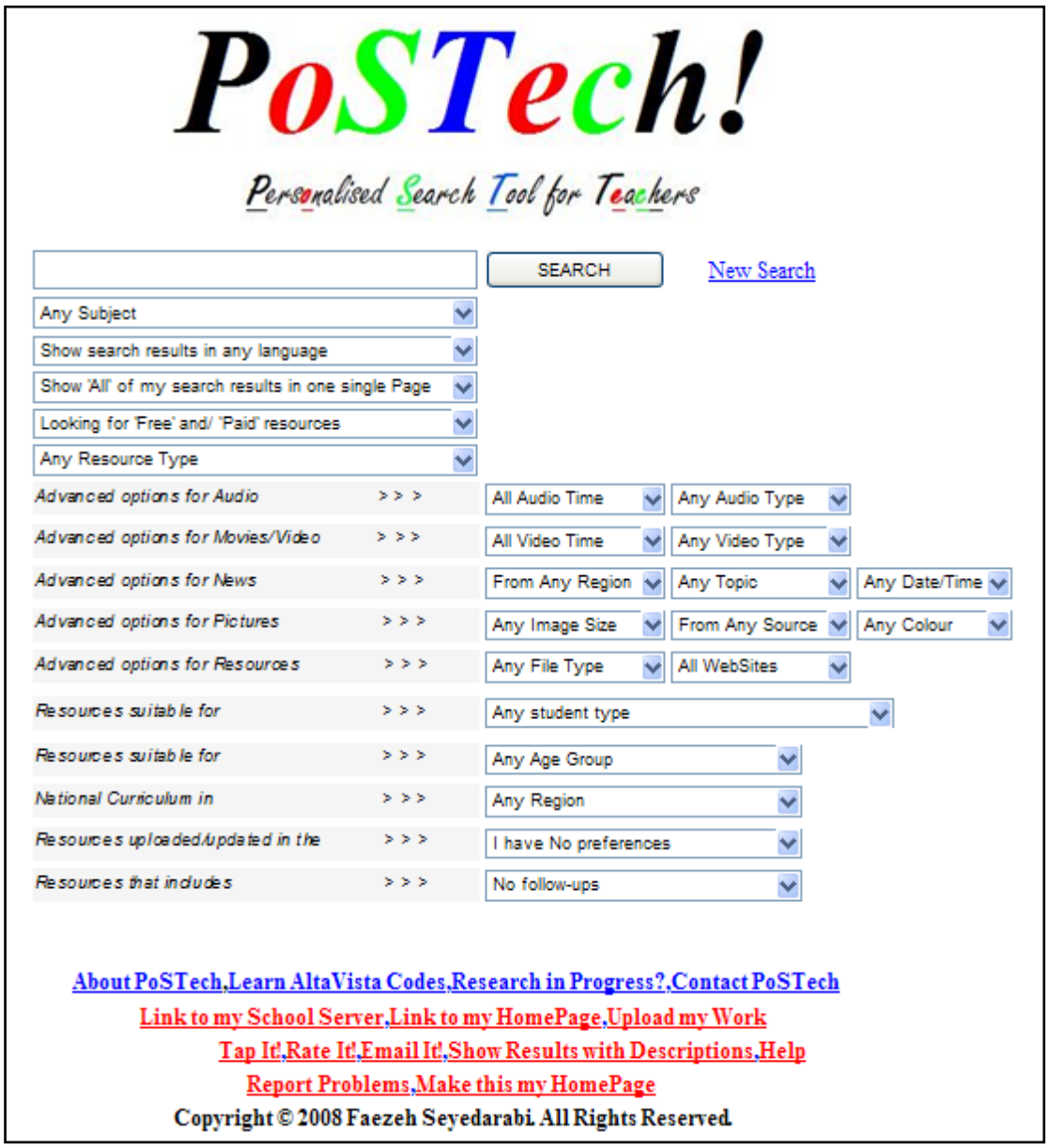
1 – A simpler interface with more flexibility – search options listed under the 'Profile' were re-grouped under a new heading of 'Advanced' search. The reason for this change was to enable individual teachers to restrict their search results without having to save their profile prior to their search; teachers were no longer required to save their profile every time they logged into the search tool. Moreover, the interface background colour of the search tool was changed from black to white (screenshot 5).

2 – Removing inappropriate 'error messages' – 'error' messages were all removed; teachers were free to choose as many or as few search options as they wished. Instructive messages were added, as tool tips were made visible to users when features were pointed at by the cursor i.e. 'Click here to exit' or 'Close' the page (appendix IX; section A).

The menu items used for the revised search tool remained the same although there was a slight modification in the wording of 'Gray Search!' and 'See Google Codes': 'What is 'Gray Search?' was rephrased as 'Research in Progress?' and 'See Google Codes' was replaced with 'Learn AltaVista Codes' (appendix IX; section A).

3 – Making categories and procedures simpler to understand – to simplify the search tool's interface design, all items/categories were presented in one single page. The five separate headings ('Cross-Curricula', 'Differentiation', 'Project-Based', 'VAK Plus' and 'Profile') were all removed along with the repeating items/options that were previously adopted (screenshot 5).

Ten new subtitles were added to the search tool's interface in order to provide teachers with further clarification and explanation about the revised search tool's options or categories (screenshot 5 and appendix IX; sections A and D).



Screenshot 5 The revised search tool designed in the 2nd round of the case study.

In addition to the third change outlined, an information page outlining the motivation for developing the search tool along with the contact details of the researcher (myself) were added to the search tool's website titled "About PoSTech" and "Contact PoSTech" (screenshot 5).

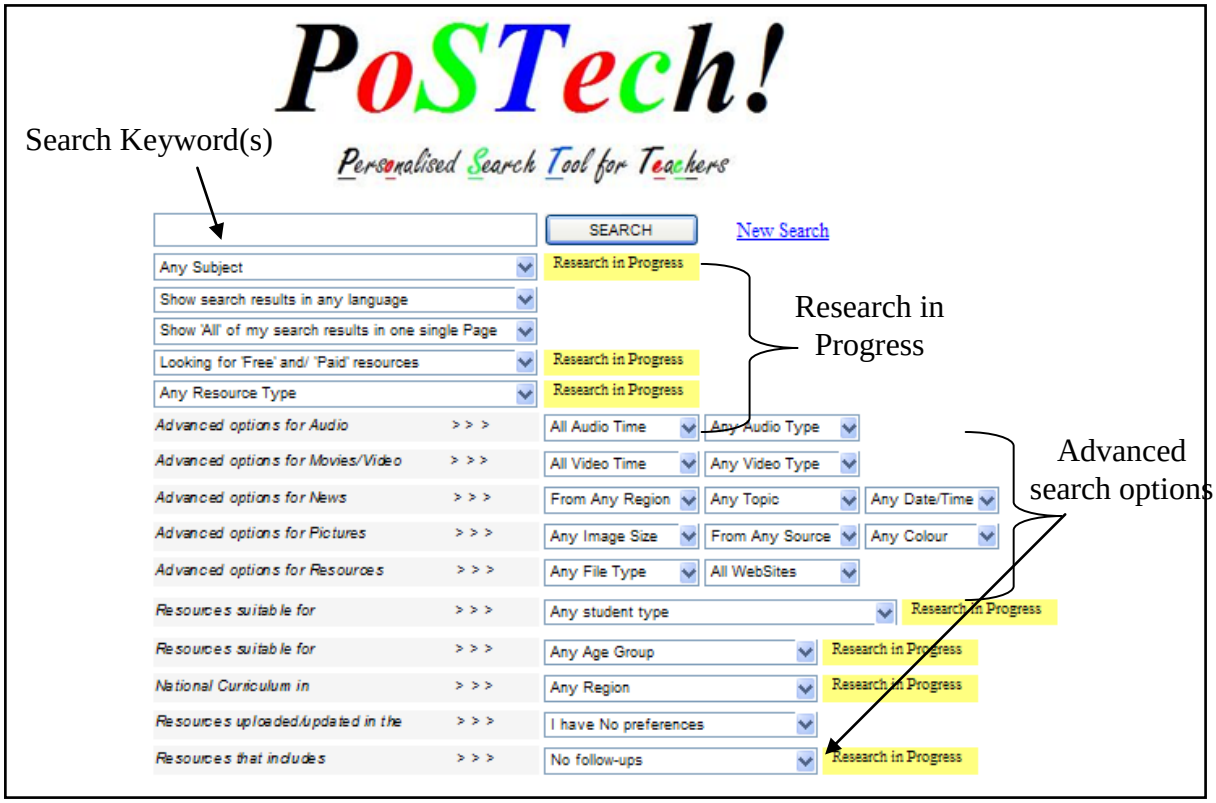
4 – Improving user access – the search tool was made available to teachers via a web site (www.postech.me.uk) eliminating the need for a login (username and password) and any software downloading.

Finally, to create an impression of a possible personalised online search tool, teachers' queries (typed keywords and selected search options) were retrieved from AltaVista's repository or search engine. Search results were presented to teachers in two separate windows. These windows were positioned next to each other and were made visible to teachers after clicking on the 'Search' button. To view the two windows, teachers were required to scroll down the web page, where the following information could be viewed:

On the Left hand side of the web page – search results for teachers were retrieved using AltaVista's *standard* search options like 'Language' and 'Image Colour', and *advanced* search options like 'File Type' and 'Date'; in this case study AltaVista's repository and its search features were used to retrieve individual teachers' search results.

On the Right hand side of the web page – search results for teachers were retrieved using AltaVista's standard and advanced search options in addition to search options labelled 'Research in Progress'. The 'Research in Progress' options are *search features* which were *selected or highlighted by individual teachers in the 1st round of the case study* (appendix IX; section D), *but not currently supported by AltaVista.* In the revised search tool there were *seven* 'Research in Progress' search options consisting of 'Subject', 'Free and/Paid resources', 'Resource Type', 'National Curriculum', 'Age Group, 'Region' and 'Follow-ups' (screenshot 6).

Therefore, returned search results shown on this side of the web page (right hand side window) were said to be personalised or at least partially personalised in comparison to the search results shown on the left hand side of the web page (described above).



Screenshot 6 Informing Teachers about 'Research in Progress' search options.

Due to the incorporation of the above search features and options it is important to reiterate that individual teachers' search results, e.g. pages viewed, links clicked and quality of online resources was not investigated nor discussed, as the focus of this study is to investigate the options and features used by individual teachers in an online search tool and is *not* on their search results.

5.6 Evaluation of the revised search tool in the 2nd round of the case study

To evaluate the revised search tool, the researcher contacted those teachers who evaluated the first search tool and had answered 'Yes' to question 1C (researcher's future contact) in the online questionnaire forms (described earlier).

However, out of the fifteen teachers who completed the online questionnaire forms, only four teachers were available for evaluating the revised search tool (appendix VII; section B).

Hence, to overcome the low number of teachers, an advert was placed on educational forums and in mailing groups to request other teachers to participate in the study. The advert was placed in the 'DfES Standards Site Forums', 'Teacher Resource Exchange', 'Teacher Forum UK', 'Teachers Talk', 'Technology Teacher Forum' and the 'Becta ICT research network'.

The researcher also asked colleagues and friends to help with locating individual teacher practitioners in the UK. In addition, as a token of appreciation the researcher decided to donate £1 to the SOS Children's Villages (charity number 1069207) for every completed questionnaire. This information was stated in all the online adverts and later in teachers' consent forms; the charity SOS was informed of this decision prior to the posting of messages.

Consequently, thirty teachers agreed to take part in evaluating the revised search tool. In this round of evaluation, 26 teachers were first time users of the (revised) search tool and the remaining 4 teachers evaluated the search tool for the second time.

Evaluation of the revised search tool was carried out using three research instruments: a questionnaire, observation and interview (figure 5). Structured observations and semi-structured interviews were used to further investigate the extent to which web personalisation enhances teachers' internet searching for resources within the context of the revised search tool. Moreover, individual teachers' evaluation of the revised search tool was estimated to take approximately 25-30 minutes, which included completing the questionnaire and doing the observation and the interview (appendix VII; section D).

The thirty teachers mentioned were asked to outline their teaching background, online searching practices, needs and experiences by initially completing a paper questionnaire followed by carrying out two search tasks in the presence of the researcher and finally being interviewed to further discuss their individual online searching needs and practices when using the revised search tool.

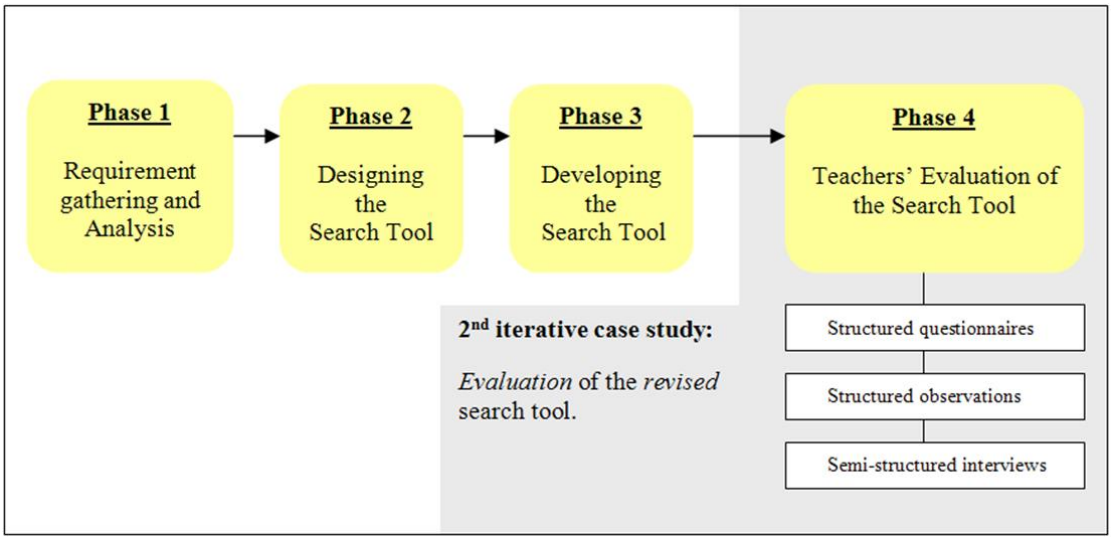


Figure 5 The evaluation of revised search tool by teachers using three research instruments in phase four of the 2nd round of the case study.

The data obtained from the structured questionnaires, observations and semi-structured interviews are analysed and discussed in chapters 6, 7 and 8 of this thesis, respectively.

5.7 Summary

In this chapter, data generated from the 1st round of the case study, together with the design and development of the revised (second) search tool for the 2nd round of the case study were described and discussed.

The following chapter begins by discussing findings obtained from paper questionnaires in the second round of the case study. This questionnaire was carried out in phase four of the 2nd round of the case study among thirty teacher practitioners in the UK educational settings.

Chapter 6

Profiling teacher participants in the 2nd round of the case study: Evaluation of the revised search tool

In this chapter, results from the structured paper questionnaires obtained in phase four of the second round of the case study are analysed. The aim of this questionnaire is to profile the demographic information and experiences of the thirty teacher practitioners who participated in this case study. Profiling information is also used to link individual teachers' demographic and experiences with their account of the revised search tool, outlined in the subsequent chapter of this thesis. Hence, the purpose of this chapter is not to answer any of the research sub-questions outlined in this thesis.

6.1 Overview

In this chapter, data obtained from the thirty structured questionnaires in phase four of the second round of the case study are described (figure 6). This questionnaire consisted of twelve questions and answers to questions 1 to 4 of the paper questionnaire was used to collect demographic information and experiences of teachers. This included, profiling individual teachers' age, gender, level of education

worked in, subject, teaching experience and, web and search engine experience. Full analysis relating to this section is provided in appendix VII; section C.

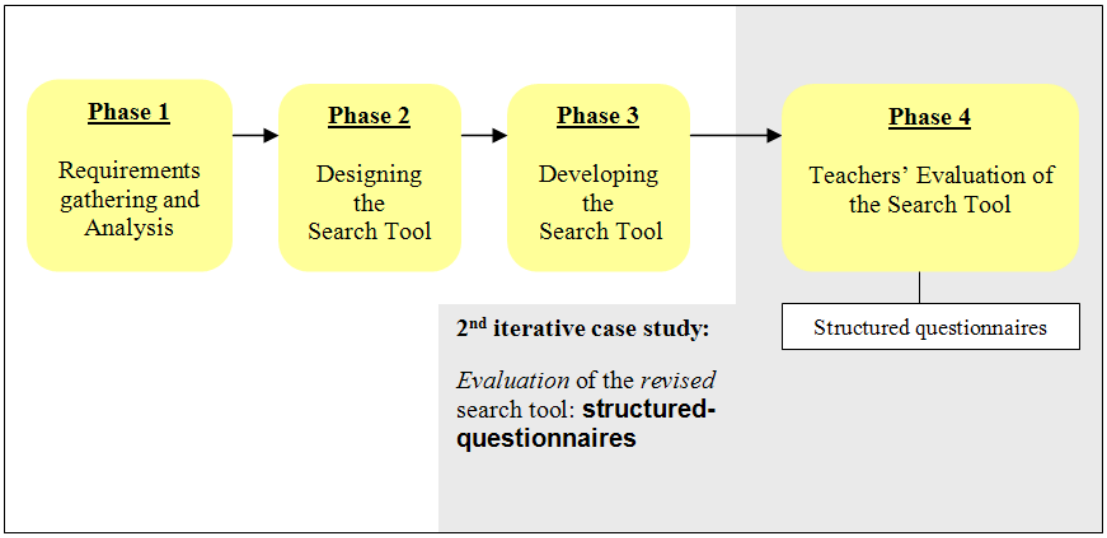


Figure 6 The evaluation of revised search tool by teachers using structured questionnaires in phase four of the 2nd round of the case study.

The aim of this questionnaire is to profile the responses of individual teachers with their demographic information and experiences. The researcher will use profiling information to link teachers' account of the revised search tool with their demographic information, web and search engine experiences (appendix VII; section C), outlined in the subsequent chapter of this thesis. Hence, the purpose of this chapter is not to answer any of the research sub-questions outlined in this thesis.

The following sections of this chapter, will describe data obtained from the paper questionnaire (question numbers five to twelve) that is teachers' usages of online resources, search engine and search services together with search success ratings, reasons for using a particular search engine, current problems of search services and their personal web and search engine experiences.

6.2 The online resources usages of teachers (Questionnaire Q5 & Q6)

In question 5, teachers were asked if do look for online teaching resources. In this question, teachers could either answer 'Yes' or 'No'.

Results showed that individual teachers do search for online resources as all the 30 teachers answered 'Yes' to looking for teaching materials online.

6.3 The search engine usages of teachers (Questionnaire Q7)

In question 7, teachers were asked to select the kind of search engine/s they use. In this question, teachers were given the option of selecting one or more search engines (table 18). This allowed the resulting output to exceed 30 (sample size of 5 male and 25 female teachers) as each teacher was allowed to make one or more selections.

Search engine	Number of times teachers selected (n=30)
Google	29
Yahoo	15
Ask Jeeves	6
Google Scholar	5
AOL	4
AltaVista	3
Other	3
MSN	2

Table 18 **The search engine usages of individual teachers. The data represents the number of times a particular search engine was selected by teachers.**

Findings from table 18 show that almost all teachers selected the search option 'Google'. Half of the teachers selected the search engine 'Yahoo'. The 'Other' search engines used by individual teachers were the BBC search engine (an educational website) and 'mamma.com' (a meta-search engine).

6.4 The usages of search services by teachers (Questionnaire Q8)

In question 8, teachers were asked about their frequency of using search services.

Frequency of using search services	Number of times teachers selected (n=30)
Always	8
Once a day	4
Once a Week	7
Once a Month	4
Every Three-Months	1
Occasionally	6
Never	-

Table 19 Search service usages of individual teachers. The data represents the number of teachers selecting the frequency of their search service usage.

Finding from the above table shows that nearly half of teachers selected options 'Always' and 'Once a day'. Moreover, some teachers selected the option 'Once a Week' (table 19).

6.5 Search success ratings of teachers (Questionnaire Q9)

In question 9, teachers were asked about their search success in finding useful online teaching resources.

Search success	Number of times teachers selected (n=30)
Always	-
Most of the time	19
Sometimes	11
Never/Rarely	-
Don't Know	-

Table 20 The search success ratings of individual teachers. The data represents the number of teachers selecting their search success rate of finding required online resources.

Findings from the above table show that all of the thirty teachers surveyed in this study, were unable to 'Always' find their required online resources. Most of teachers

selected the option ‘Most of the time’ and less than half of the teachers selected the option ‘Sometimes’ (table 20).

6.6 Reasons given by teachers for using a particular search engine (Questionnaire Q10)

In question 10, teachers were asked to select their most liked search features or characteristics of using a particular search engine. The teachers were given the option of selecting one or more search features/characteristics (table 21). This allowed the resulting output to exceed 30 (from the sample size of 5 male and 25 female teachers), as each teacher was allowed to make one or more selections.

Online search features/characteristics	Number of times teachers selected (n=30)
Speed of information and variety of information/resources	21
Finding things I didn’t originally set out to search for	18
It makes it possible to find a topic explained in various ways	13
Instant Success!	7
Other	1

Table 21 The most liked search features of individual teachers. The data represents the number of teachers selecting their most liked search features.

For ease of analysis, option ‘All’ was removed from the list of answers, presented under question 10; in total five teachers selected this option. Hence, the number of times teachers selected, options ‘Speed of information and variety of information/resources’, ‘Finding things I didn’t originally set out to search for’, ‘It makes it possible to find a topic explained in various ways’ and ‘Instant Success!’ were all increased by five (table 21).

Findings from the above table show that the majority of teachers selected the option ‘Speed of information and variety of information/resources’. More than half of the teachers selected, the option ‘Finding things I didn’t originally set out to search for’.

Moreover, nearly half of teachers selected the option 'It makes it possible to find a topic explained in various ways' (table 21).

6.7 Current problems of search services faced by teachers (Questionnaire Q11)

In question 11, teachers were asked to select the search features or characteristics they most disliked, with using existing search services. Teachers were given the option of selecting one or more search engines (table 22). This allowed the resulting output to exceed 30 (with sample size of 5 male and 25 female teachers), as each teacher was allowed to make one or more selections.

Online search features/characteristics	Number of times teachers selected (n=30)
Wasted time in fruitless searches	22
Too many results and becoming distracted	17
Cluttered Images	5
Materials that are not clearly linked to the national curriculum	11
Other, Please specify	3

Table 22 The most disliked search features of individual teachers. The data represents the number of teachers selecting their disliked search features.

Findings from the above table show that the main search feature/characteristic disliked, by teachers in existing search services was 'Wasted time in fruitless searches'. More than half of selections were the option 'Too many results and becoming distracted'. Moreover, less than half of selections were 'Materials that are not clearly linked to the national curriculum' (table 22). The other online searching problems highlighted by individual teachers were associated with access restrictions and content suitability of websites, in general;

"Broken lines" (Teacher 5).
"Materials with restricted access" (Teacher 11).
"Commercial websites" (Teacher 14).

6.8 Personal experiences of teachers with using the Web and search engines (Questionnaire Q12)

In question 12, teachers were asked to select their web and search engine experiences. Teachers were provided with two statements; "I have a lot of Web experience" and "I have a lot of search engine experience", which they needed to, read and select their most appropriate answer. In this question, teachers were required to select one answer only (tables 23-24).

Due to the size of samples in this round of the case study, categories 'Strongly disagree' and 'Mostly disagree' were jointly classified as *'Disagree'* and, the option 'Neither agree nor disagree' was rephrased as *'Neutral'*.

I have a lot of Web experience	Number of times teachers selected (n=30)
Agree	19
Neutral	9
Disagree	2

Table 23 Web experiences of individual teachers. The data represents the number of teachers selecting their Web experience.

I have a lot of search engine experience	Number of times teachers selected (n=30)
Agree	19
Neutral	10
Disagree	1

Table 24 Search engine experiences of individual teachers. The data represents the number of teachers selecting their search engine experience.

Findings from the above tables show that the majority of teachers 'Agree' with the option to having a lot of web and search engine experience. Furthermore, nearly half of teachers selected, the option 'Neutral' to having a lot of web and search engine experience (tables 23 and 24).

The final section of this chapter will summarize and briefly discuss data obtained from the above paper questionnaires within the context of previous studies, in order to highlight teachers' personalised web searching needs and preferences, in general.

6.9 Summary

The structured paper questionnaire in phase four of the second round of the case study was used to contextualise teachers (thirty teacher practitioners) account of their use or evaluation of the revised search tool (chapter 7).

Findings obtained from **questions 5 and 6** showed that all the thirty teachers in this case study do indeed search for online resources; findings from **question 7** showed that Google is used by almost all teachers studied in this case study; findings from **question 8** showed that nearly half of the teachers were using search services 'Once a day'; findings from **question 9** showed that *all teachers in this case study* were indeed unable to 'Always' find their required online resources; findings from **question 10**, showed that *majority of teachers liked* 'Speed of information and variety of information/resources'. Moreover, 'Finding things I didn't originally set out to search for' was liked by more than half of teachers in this round of the case study; findings from **question 11**, showed that *majority of teachers disliked* 'Wasted time in fruitless searches'. In this case study, more than half of teachers disliked search engines producing 'Too many results and becoming distracted'; and, findings from **question 12** showed that *majority of teachers considered themselves as having a lot of web and search engine experience*.

Findings summarized above, also highlight teachers' web searching needs and preferences within the context of previous studies, in general. For example, findings from **questions 5 and 6**, showed that individual teachers do use search services to obtain online teaching resources, which subsequently fall into Rose and Levinson's (2004) description of 'Resource' goals (section 6.2).

As a second example, findings from **question 7**, challenges Twidle, Sorensen et al.'s report (2006), about lack of internet access of schools, as individual teachers were able to access and use search services on regular basis. The finding shows that

Google, a generic search service, is too used by individual teachers when searching online for teaching resources (section 6.3). Thus, highlighting the importance of teachers having familiarity with search options and features, particularly when designing a personalised search tool for teachers like the revised search tool (PoSTech).

In addition, findings from **question 10**, supports Madden and colleagues (unpublished work) third reason for users selecting a particular search engine, which was 'Familiarity'.

Lastly, findings from **questions 11**, are in line with Chowcat, Phillips et al.'s work (2008), which identified teachers' lack of time, as one of the main barriers to fully exploiting the educational potential of digital technology (section 6.7).

In this case study, the main problems of teachers (search features/characteristics) with the current search services was having 'Wasted time in fruitless searches' followed by receiving 'Too many results and becoming distracted' (section 6.7). Hence, findings also support some of the NetDay (2001) survey results on teachers' problems of incorporating internet into their classroom teaching, such as receiving "too much information" and finding "inappropriate material on the web".

However, this finding challenges Morris (2002) survey results on the main reasons for the lack of ICT integration of teachers in their classroom teaching. In this case study, searching time and filtering through a vast amount of search results were identified as two main problems of individual teachers with existing search services compared to search engines 'user-friendliness', 'availability' and 'access' .

With this summary in mind, the following chapter of this thesis will discuss data obtained from the evaluation of the revised search tool in the second round of the case study that is both the structured observations and semi-structured interviews, in order to answer the two research sub-questions that were outlined in chapter 3.

Chapter 7

Results from teachers observation and interview in the 2nd round of the case study:Evaluation of the revised search tool

In this chapter, search options and features needed by teachers and prefer to have when using the revised search tool, in the second round of the case study are described. Hence, results obtained from the structured observations and semi-structured interviews are described, respectively.

7.1 Overview

This chapter begins by observing the search options used by teachers together with their online searching practices (query construction) via the revised search tool, in the second round of the case study (sections 7.2 - 7.4).

The steps taken to perform structured observations are described next, using examples (screenshots of video recordings) from the search sessions of individual teachers. Moreover, the screenshots shown in this chapter will not be examined in detail, as these are only meant to give the reader an overview of steps taken by teachers when evaluating the revised search tool. The video recordings of individual teachers can be found in appendix VII; section F.

In this chapter, findings from semi-structured interviews of individual teachers (interview transcripts), are described in sections 7.5 – 7.7.

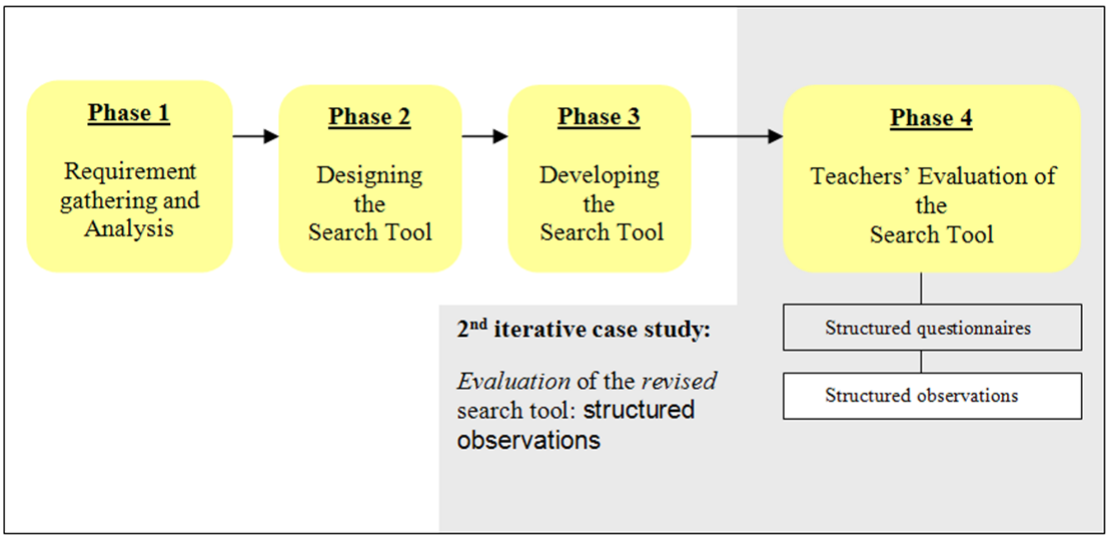


Figure 7 The evaluation of revised search tool by teachers using structured observations in phase four of the 2nd round of the case study.

In this case study, both structured observations and semi-structured interviews, were carried out among thirty teachers, in phase four of the second round of the case study (figure 7).

7.2 Structured observations

In this case study, the following two computer-based tasks, were performed by teachers in order for the researcher to further learn about the kind of search options teachers use and the nature of their query constructions (chapters 4 and 5; section 6.1)

- **Task 1** – in this task teachers were asked to perform a *single* search session using the designed search tool called 'PoSTech' (Personalised Search Tool for Teachers). Teachers were encouraged to look for something that they were going to use for their next teaching lesson. In this task, teachers were able to *repeat search queries* as many times as they desired.

- **Task 2** – in this task teachers were asked to perform the same query using all the available search options (features) in PoSTech. Teachers were encouraged to select (click and view) all the other available search features in the revised search tool. In this task, teachers were also able to *repeat search queries* as many times as they desired before making their final search option selections and clicking on the 'Search' button.

The number of search queries performed by individual teachers in each search session was determined by the search success of teachers finding their required

online resources or their decision to abandon their search. In other words a task ended when a teacher found a useful resource(s) online or when the teacher abandoned his/her search (teacher gave up).

Furthermore, to create a look and feel of a search tool, queries were retrieved from the AltaVista's repository via the revised search tool. This included the typed Keywords of teachers and their selected search options. Further explanation for choosing AltaVista is available in chapter 5; section 5.5.
Search results were presented to teachers in two separate windows. These windows were positioned next to each other, side by side, and were made visible to teachers after clicking on the 'Search' button. Viewing the two windows required teachers to scroll down the web page. The text below describes the contexts teachers viewed on the web page:

On the Left hand side of the web page – the query search results of teachers were retrieved using AltaVista search engine. This involved the revised search tool sending *standard* search options like 'Language' and 'Image Colour', and *advanced* search options like 'File Type' and 'Date' to AltaVista. In this case study, AltaVista's repository and its search features were used to retrieve return search results (chapters 4 and 5; section 5.6).

On the Right hand side of the web page – queries were retrieved from the AltaVista search engine using all the selected search options of teachers. This involved the revised search tool sending standard, advanced and 'Research in Progress' search options to AltaVista. The 'Research in Progress' search options were identified by individual teachers in the first round of the case study (chapter 5 and appendix IX; section D), but were *not directly supported* by AltaVista search algorithm. In this case study, there were *seven* 'Research in Progress' options that is (1) 'Subject', (2) 'Free and/Paid resources', (3) 'Resource Type', (4) 'National Curriculum', (5) 'Age Group, (6) 'Region' and (7) 'Follow-ups'.

In this case study, the query lengths of teachers that is the number of keywords typed by individual teachers in each query session and their and search results were neither assessed nor discussed, as the focus of this study was to investigate the kind of

search options teachers need and prefer to have when searching online via the revised search tool for teaching materials. The search results included the number of keywords typed by individual teachers in each query session, pages viewed, links selected, resource type or quality of returned search results.
Hence, presenting returned search results in the context of a personalised (right hand side window) and non-personalise (left hand side window) search was purely to get teachers engaged in performing the two search tasks mentioned above (chapter 4; sections 4.3 and 4.5.3), that is changing and or modifying their selected search options.

To illustrate the performed activities of individual teachers in this observational study, search sessions recorded for teacher numbers 15 and 21 are described in the following section of this chapter. These teachers were picked to demonstrate the revised search tool typical use of teachers. These teachers performed at least two search queries using a variety of search options in tasks 1 and/ task 2. Moreover, recordings of all search sessions (video clips) can be found in appendix VII; section F.

- ***Teacher Number 15***

This teacher is female in the 35+ year age group. She teaches English and History that is 'Art & Humanities', at a secondary school in London. She has three years of teaching experience and perceives herself to have 'a lot of' web and search engine experience. In preparation for her next lesson, she is using the revised search tool to look for lesson plans on 'Oliver Twist' (appendix VII; section F).

Task 1 – at the first instance, teacher 15, types 'oliver twist lesson plan' and clicks on the search button. She then scrolls down the webpage to see her search results displayed in two separate windows (screenshot 7).

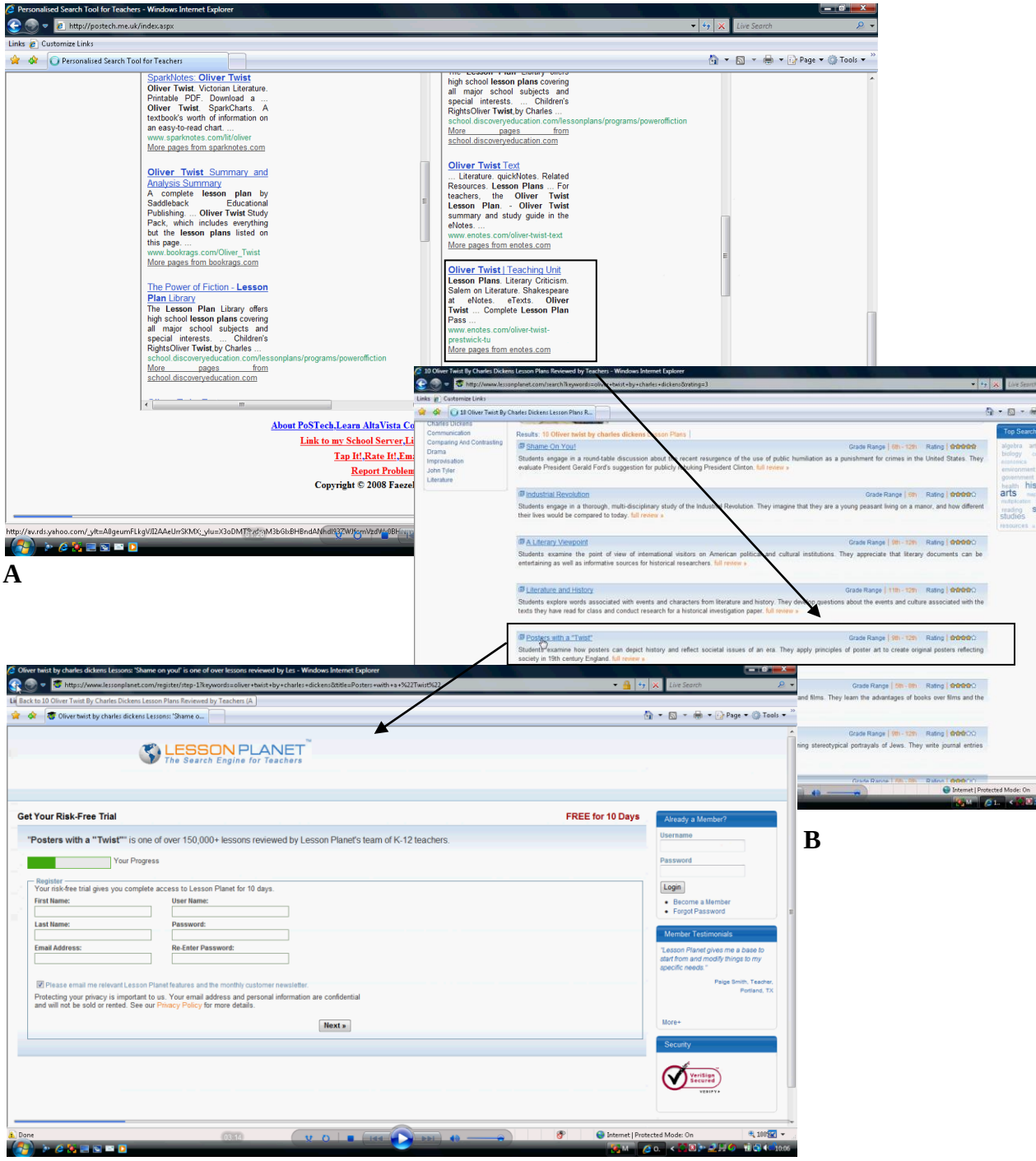
A

B

Screenshot 7 **Windows showing teacher 15 typing her first query in the revised search tool; (A) Shows the keywords typed by the teacher and her selected search options in PoSTech. (B) Shows the personalised (right hand side window) and non-personalise (left hand side window) returned search results.**

Teacher number 15, first looks at the results produced in the left hand side window by reading the link titles, descriptions or website addresses on the first page but finds no useful information. She then looks over to the right hand side window, and finds a useful poster about Oliver Twist for her students to do. However, further to viewing the website, she decides to abandon the resource or website, as she learns that viewing the lesson plan (this particular activity) requires creating a user account to log into the website. Consequently, she decides to returns back to the search tool (screenshot 8). Below is a quotation extracted from teacher number 15's observation schedule:

> "[…] that's a good poster with twist so girls are going to do posters later on so I need to know about you know the session element […] oh no [this resource is] get your risk free trial and I don't think I will try that [as] I think they ask [you] to log on aren't they this is a poster of free trial [teacher clicks on the back link] this take, this should take [me] to the back doesn't it" (Teacher 15).



Screenshots 8 **Windows showing teacher number 15, screening through her returned search results; (A) The teacher is clicking on a possible, useful search result or link. (B) Teacher clicks on a useful resource in the website. (C) Teacher abandons the website due to access restrictions.**

Teacher number 15, revises her query by typing 'child labour Victorian era lesson plan' and then clicks on the search button for the second time (2nd search query). She

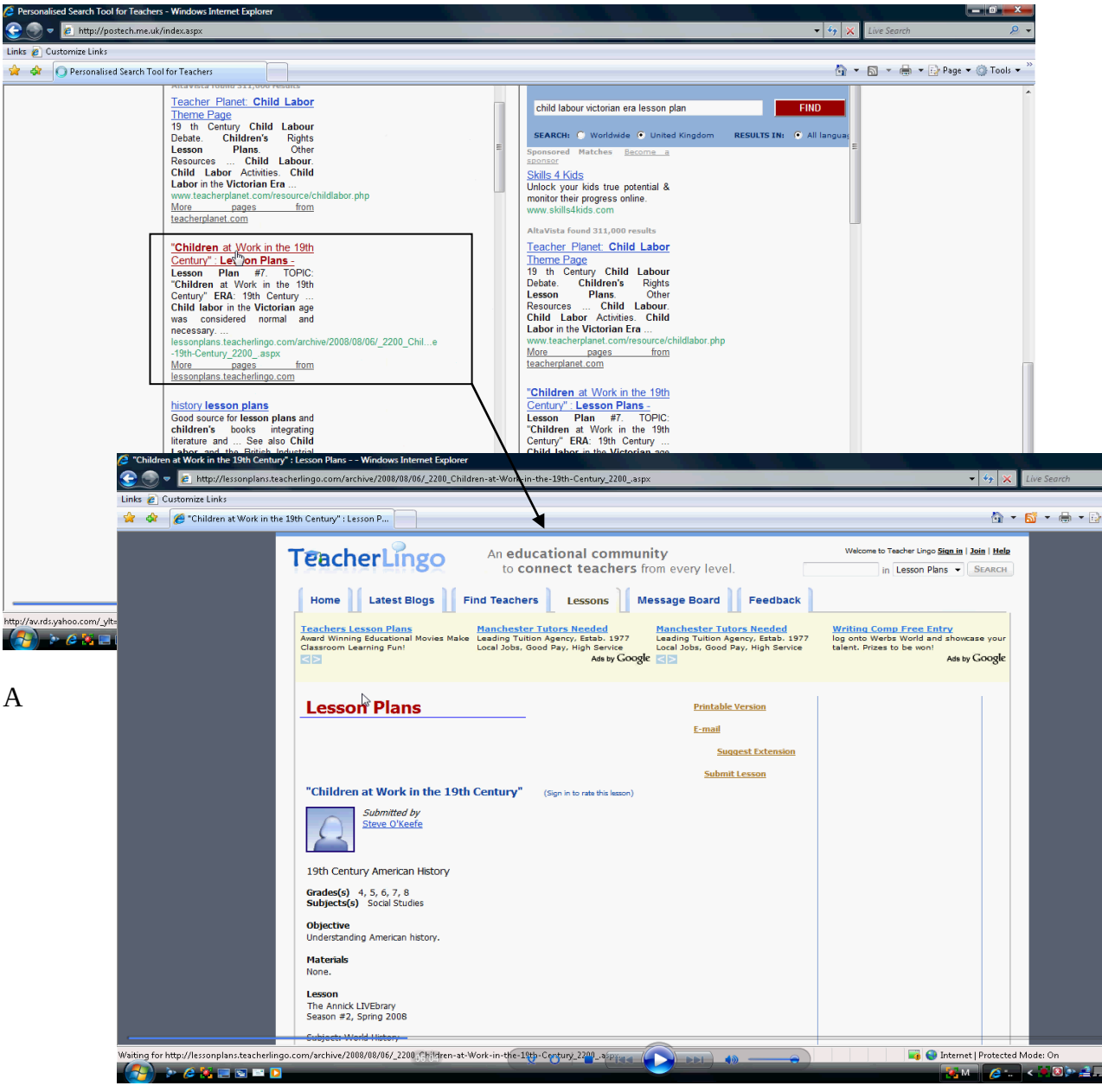
looks at the right hand side window, scrolls down, reads the returned search results produced on the first page and, decides not to click on any of the links (screenshot 9).

A

B

Screenshot 9 Windows showing teacher number 15 revising her query; (A) The teacher changes her search keywords. (B) Teacher views her returned search results after executing the new query.

Consequently, the teacher turns over to the left hand side window, finds one possible useful search result on the first page which is clicked on and later abandons by returning back to the search tool, as she finds the contents of the website inappropriate and not useful. At this point the teacher informs the researcher that she wishes to stop her search and moves to the second task (screenshot 10).



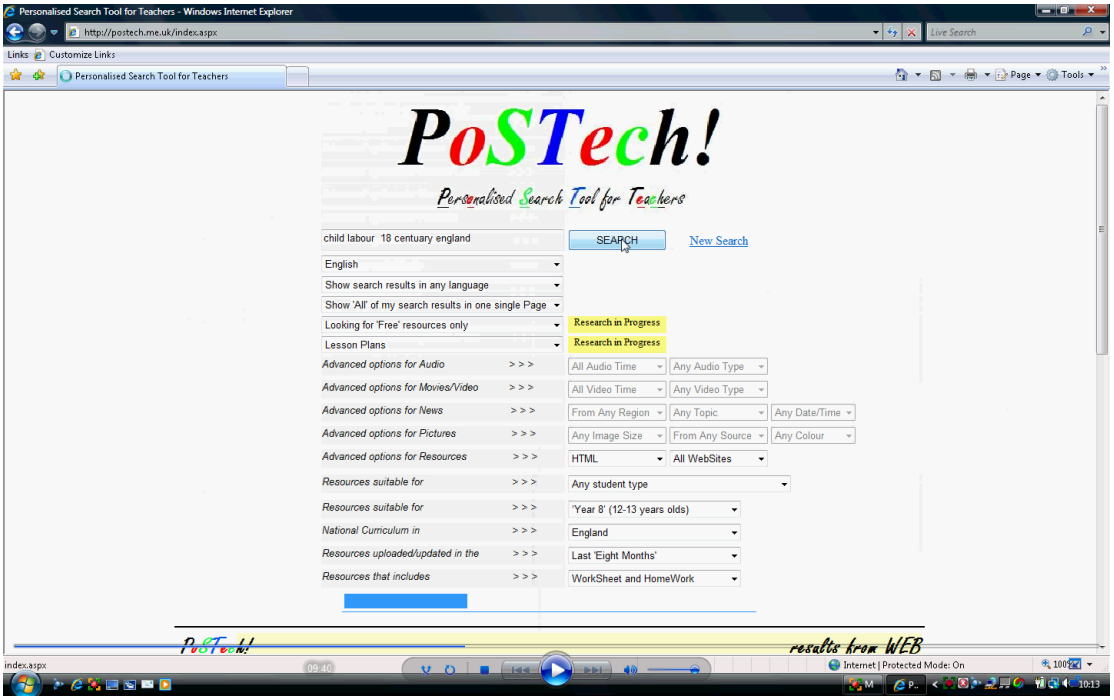
A

B

Screenshot 10 **Windows showing teacher number 15 screening through her returned search results for the second time; (A) The teacher is selecting one possible useful website. (B) Teacher finds the contents of the website inappropriate or not useful after viewing it.**

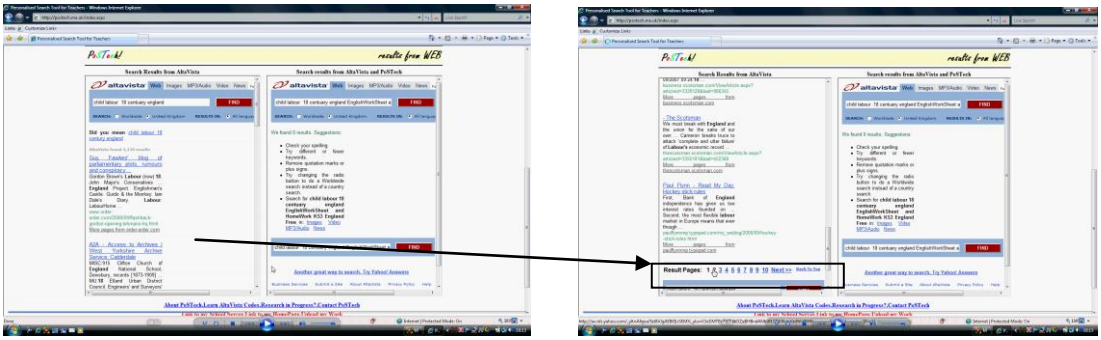
Task 2 – in this task, teacher number 15 is encouraged by the researcher to navigate through the twenty-two search options that were available in the revised search tool, by means of opening or clicking on each option at least once, before proceeding to the 'Search' button.

Consequently, the teacher decides to revise her query by typing 'child labour 18 centuary england' together with choosing *'English'* as her subject, resource type as *'Lesson Plans'*, age group as *'Year 8'*, national curriculum as *'England'*, file type as *'HTML'*, follow-ups resources as *'Worksheet and Homework'*, free and/paid resources as *'Free'* resources and, finally online resource(s) that were '*uploaded within the 'Last eight months'* (screenshot 11).



Screenshot 11 Window shows teacher number 15 revising her query by changing search keywords and including additional search options.

Once again, the teacher clicks on the search button and scrolls down to see her search results, shown in two separate windows. She first looks at the results produced in the left hand side window by reading through the links' titles, descriptions and or website addresses on the first and second pages of her returned search results but finds no other new or relevant websites. She then looks over to the right hand side window and observes a message saying 'We found 0 results' (screenshot 12).



A **B**

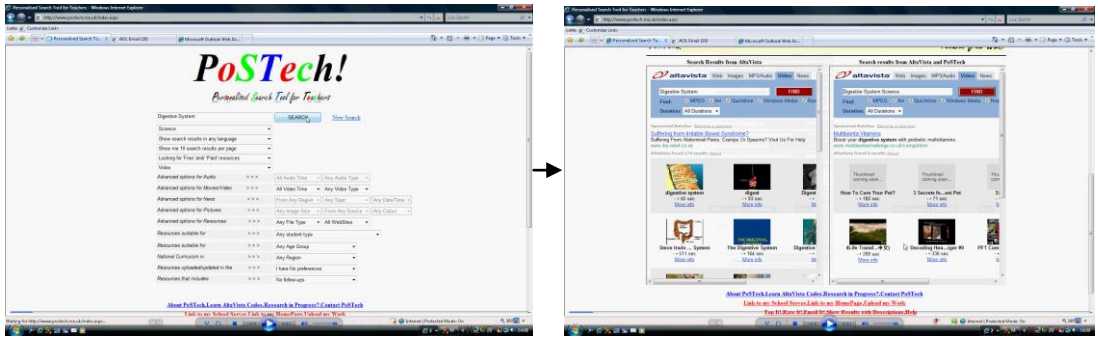
Screenshot 12 Windows showing teacher number 15 screening her search results for the third time; (A) The teacher reads her search results in the left hand side window. (B) Teacher clicks and views the second page of her returned search results.

At this point, the teacher informs the researcher that she wishes to terminate her search and this observation.

- ***Teacher Number 21***

This teacher is also female and in the 35+ year age group. She teaches various subjects at a primary school, in London. She has fifteen years of teaching experience and perceives herself to have a lot of web and search engine experience. For her next lesson she is using the revised search tool to look for online resources on 'Digestive System' (appendix VII; section F.).

Task 1 – at the first instance, teacher number 21 types the search keywords 'Digestive System' and selects 'Science' as her subject, 'Video' as her preferred resource type and '10 search results per page' to view ten search results, per page and, clicks on the 'search' button. She then scrolls down the webpage to see her returned search results shown in two separate windows (screenshot 13).



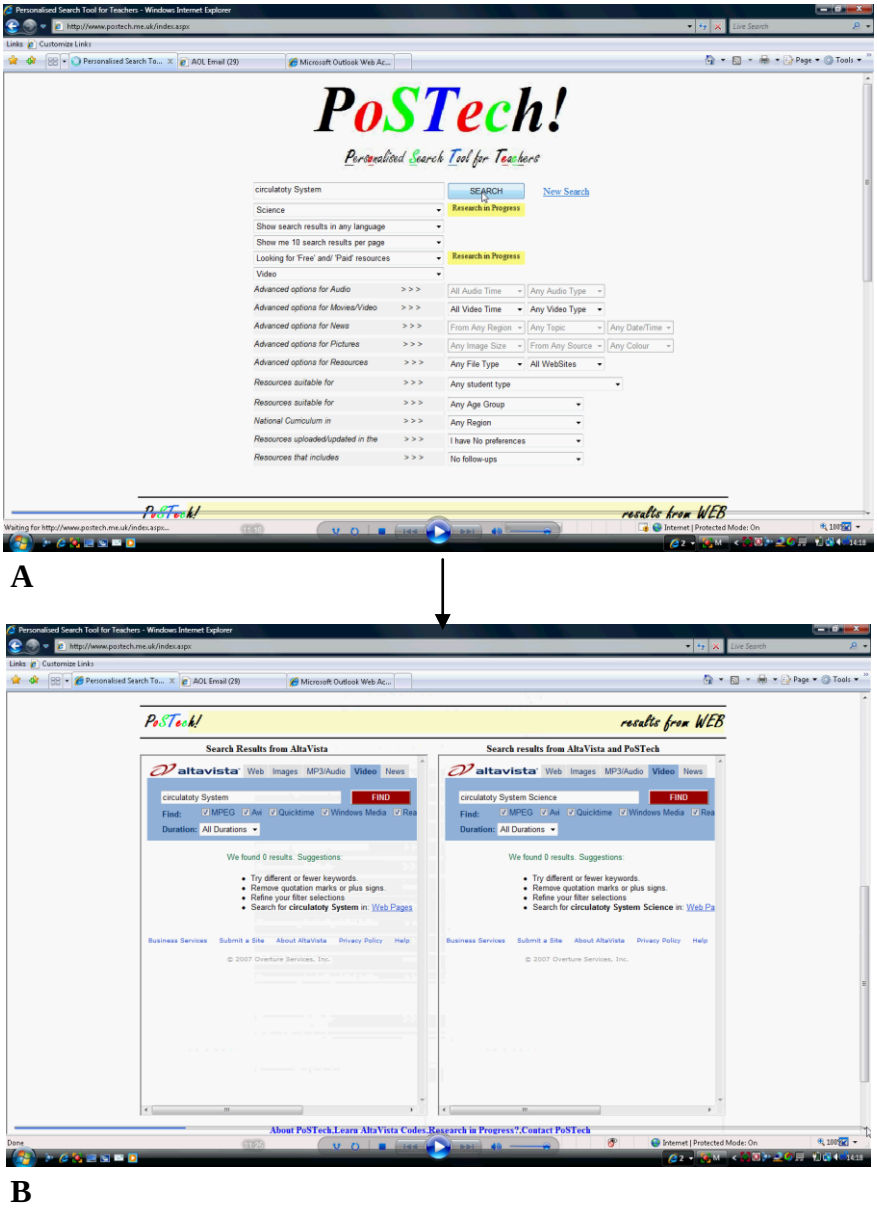
A B

Screenshot 13 Windows showing teacher number 21 query and her returned search results; (A) The teacher types search keywords and selects her preferred search options in the revised search tool. (B) Teacher views her returned search results.

Teacher number 21, first looks at the results produced in the left hand side window by reading through the links' titles, descriptions and or website addresses. She watches three of the video clips and bookmarks one for future usage (screenshot 14). She then looks over to the right hand side window (first page only) and finds the video clips not useful.

Screenshot 14 Window shows teacher number 21 bookmarking a Video clip, online.

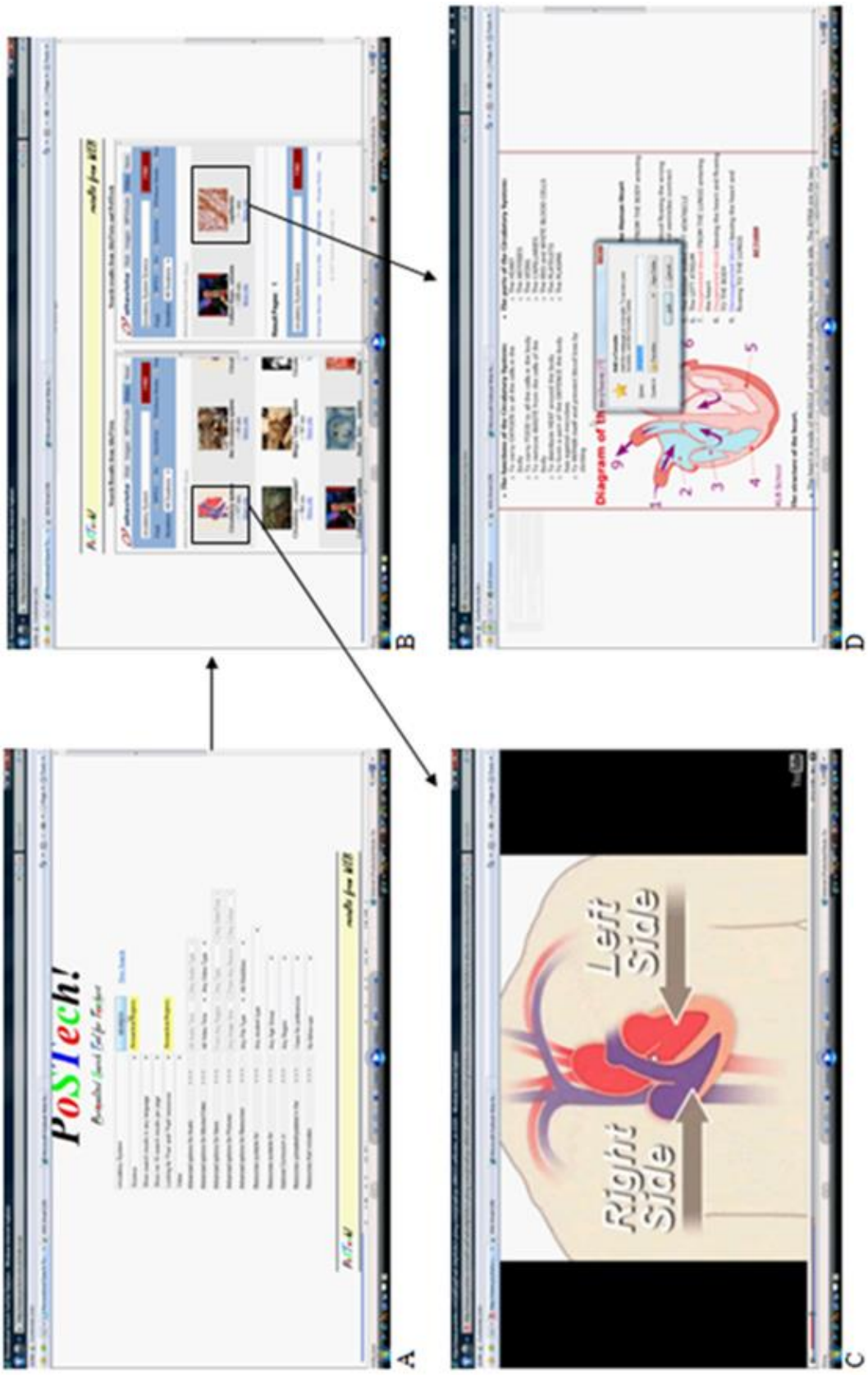
Next, teacher number 21 revises her query further (second search) by changing search keywords to 'circulatoty System' and keeping other search options unchanged. However, after clicking on the 'search' button, she observes a message saying "We found 0 results. Suggestions: check your spelling". This message appeared in both right and left hand side windows, making her realise she has misspelled the word 'circulatory' (screenshot 15).



Screenshot 15 Windows showing teacher number 21 revising her query; (A) The teacher types different search keywords and selects her preferred search options. (B) Teacher receives zero search results.

Thus, teacher number 21 revises her query (third search) by changing her search keywords to ‘circulatory System’ and clicking on the search button. She first looks at the returned search results produced on the left hand side window by reading the links' titles, descriptions and or website addresses listed in the first page and finds no useful videos. She clicks on the second page and finds one video, which she later decides to abandon due to its inappropriate level of information. She then looks over

to the right hand side window and bookmarks a video clip after viewing it (screenshot 16).

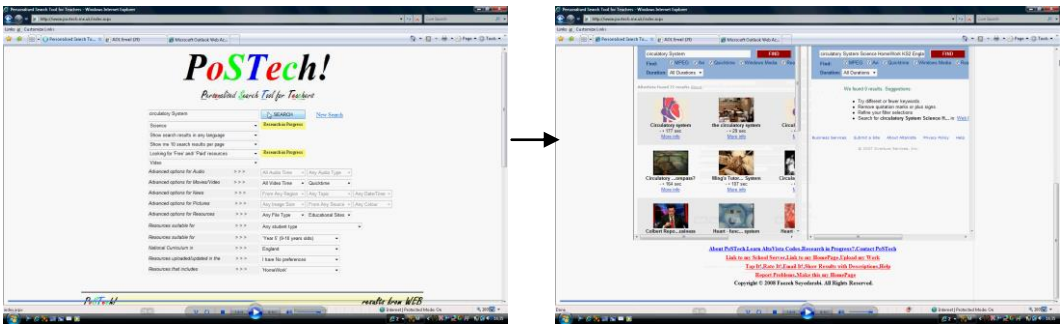


Screenshot 16 Windows showing teacher 21 revising her query and subsequently receiving her search results for the third time; (A) Teacher corrects the spelling of her typed keywords. (B) Teacher clicks on a potentially useful video from the left hand side window of the search tool. (C) Teacher watches the video clip but decides not to bookmark it. (D) Teacher views and bookmarks a useful video clip from the right hand side window of the search tool.

At this point the teacher informs the researcher that she wishes to stop her search and move to the second task.

Task 2 – in this task, the teacher is encouraged to navigate through the twenty-two search options that are available in the revised search tool, by means of opening or clicking on each option at least once, before making her final selections or proceeding to the 'Search' button.
At this point, the teacher decides to amend her selections by adding *'QuickTime'* as video type, *'Educational websites'* as source of resource, *'England'* as national curriculum and *'Worksheet and Homework'* as follow-ups for her teaching.

For the fourth time (search query), teacher number 21 clicks on the search button and scrolls down to see her search results, shown in two separate windows. She first looks at the results displayed in the left hand side window by reading through the links' titles, descriptions or website addresses by viewing the first page of her search results only, and finds one video, but classifies it as not useful. She then looks over to the right hand side window and observes a message saying "We found 0 results" (screenshot 17).



A **B**

Screenshot 17 **Windows showing teacher number 21 amending her search options. (A) The teacher includes other search options from the revised search tool. (B) Teacher screens her returned search results for the last time.**

Finally, teacher informs the researcher that she wishes to terminate her search and this observation as she is running out of time:

> "I wish I could [continue to search] but I have a class so I have to go now" (Teacher 21).

In this case study, teacher number 15 used a total of eight search options: (i) 'Subject', 'Resource Type', (ii) 'Age Group', (iii) 'Region', (iv) 'File Type', (v) 'Follow-ups', (vi) 'Free and/ Paid resources', and (vii) 'Resource last updated/uploaded time'.

Teacher number 21, used search options: 'Subject', 'Resource Type', 'Search results in one single page', 'Video Type', 'Region' and 'Follow-ups'. Hence, search options 'Subject', 'Resource Type', 'Region' and 'follow-ups' were commonly used by both teachers. Moreover, the two observations selected that is teacher numbers 15 and 21 did not use basic search tools (described below), such as 'OR' or 'NOT' searches.

Additionally, in this observation, fifty three web pages were bookmarked by teachers from which twenty one were retrieved from the revised search tool that is search results displayed in the right hand side window (appendix VII; section D). Bookmarked resources (URL addresses) were sent to the individual teachers immediately or as soon after the completion of their interviews.

The complete set of data obtained from this observation that is the thirty individual teachers are discussed in the following sections of this chapter.

7.3 Teachers usage of basic search tools

In this section, selected search queries are investigated for usage of '*basic search tools'.* This involved analysing the typed keywords of teachers against 'Plain English searches', 'AND searches', 'OR searches', 'NOT searches', 'NEAR searches', 'Nested searches', 'Wildcards' and 'Stopwords'. The aim of this analysis was to understand the preferred means of individual teachers query construction. Results from this analysis can be used to list other search options and features required by teachers when searching online for teaching resources. These particular search tools were adopted from Poremsky (2004, page 27-37):

- *'Plain English searching'* is used when search keywords are structured as questions, e.g. where teachers use words such as 'What', 'Where' or 'How'.
- *'Multiple Words'* is used when words or phrases are combined using 'AND', 'OR', 'NOT' or 'NEAR'.

- '*Nested' searches* is used when multiple words are grouped together using parentheses.
- *'Wildcard' searches* is used when special characters such as an asterisk is placed in front of a word to look for spelling variations and alternative word endings.
- Lastly, '*Stopwords' searches* is used when double quotation marks are inserted to instruct search engines to look for common words such as I, and, with or not, which may otherwise be ignored by search engines or possibly confused with Boolean operators.

The search tools discussed above and indeed in this section may not apply to all search engines, as they could adopt different symbols or features (Calishain and Dornfest, 2005; Poremsky, 2004).

Surveying the use of basic search tools in typed search keywords of teachers resulted in the following findings; twenty two out of the thirty teachers were found *not* to have used any of the mentioned basic search tools when constructing their individual search queries. Individual teachers only used keywords used in their everyday informal spoken language, English, to construct their search queries. Teachers made no use of the basic search tools described above. Finally, no evidence of 'Nested', Wildcard' or 'Stopwords' searches was found when investigating search keywords typed by individual teachers.

Teacher numbers 1, 23, 28 and 30 were the four remaining teachers who did use a search tool. 'Plain English' was used by teacher 30 and 'multiple words' (AND) were used by teacher numbers 1, 23 and 28. These teachers were found to have used characters such as 'dash', 'comma' and '/' together with capital letters as, teacher number 3 used a comma, teacher number 26 used a dash, teacher 4 number used '/' character and teacher number 6 used capital letters. These basic search tools usages of individual teachers are further discussed below.

7.3.1 Searching in 'Plain English'

In this observation, one teacher used 'Plain English' or 'natural-language' searching that is teacher number 30. This particular teacher typed the following question:

> "What are the factors that friction depends on?" (Teacher 30).

Teacher number 30 is female, in the age group 20-34 years. She teaches Science at a primary school in London and has 7 years of teaching experience. This teacher perceives herself to have a lot of web and search engine experience; she has rated her web and search engine skills as being at an advanced level.

This teacher performed four searches in total from which three were repeated using the above question without any modification and, in her fourth and last query she turned to using a single keyword by typing the word 'friction'.
When observing the repeated search queries performed by teacher number 30, no further manipulation of query terms was found. This included re-phrasing search keywords in the query.

7.3.2 Searching in 'Multiple' words and phrases

Out of the thirty teachers who participated in this observation, three teachers seem to have practiced the 'AND' searches:

> Teacher 1 typed "The protestant ethic and the spirit of capitalism";
> Teacher 23 typed "romans and celts", and;
> Teacher 28 typed "MR wiggle and waggle".

Also, when we look closely at the above search keywords, we find that the Boolean operator 'AND' was simply added as *another keyword* in the search queries of teachers, as it was *not* specifically typed in capital letters. In addition, query modifiers such as '+' (plus), '-' (minus) or ' "" ' (double quotes) were not used to emphasize, de-emphasize or group query terms, suggesting that in this case study, individual teachers had little or no use of advanced query syntax. The search queries are further described below using the demographic data, age and typed keywords of teachers.

Teacher number 1, is a female and in the age group 20-34 years. She teaches social sciences at a college in London and has 4 years of teaching experience. This teacher perceives herself to have a lot of web experience and neutral search engine experience.
This teacher performed eleven search queries using the following keywords; 'The protestant ethic and the spirit of capitalism' (repeated 4 times without any modification), 'Max Weber' (repeated 2 times), 'Calvinism and capitalism', 'A2

Sociology', 'Religious in sociology', 'Sociology of family' and 'Family' (each searched for once).

Teacher number 23, is a female and in the age group 20-34 years. She teaches at a primary school in London and has 5 years of teaching experience. Moreover, this teacher perceives herself to have a lot of web and search engine experience. This teacher performed eight search queries using keywords *'romans and celts'*. Other query terms typed by this teacher were 'roman britian', 'hadrians wall', 'roman invasion' and 'romans' (repeated 4 times).

Teacher number 28, is also female and in the age group 35+ years. She teaches Arabic language at a primary school in London and has 13 years of teaching experience. This teacher perceives herself to have a lot of web and search engine experience. She has repeated keywords *'MR wiggle and waggle'* three times with some modifications that is correction of spellings. This included 'wiggle and waglle' and 'MR wiglle and wagle' together with removing 'MR' from the beginning of her search query.

Apart from the basic search tools described above, the researcher also observed the use of other characters and capital letters in search keywords. Out of the thirty teachers who participated in this observation, three were found to have used the 'comma', 'dash' and forward slash '/' character. In addition to one teacher who used capital letters:

Teacher 3	typed in "Hardy Weinberg equation, questions";
Teacher 26	typed in "Maths-shape"
Teacher 4	typed "examples/names of films which caused controversy"
Teacher 6	typed "HISTOGRAM WITH UNEQUAL CLASS INTERVALS"

It should be added that characters used by teacher numbers 3, 26 and 4 did not add anything to their search results, as they were not designed to restrict search results in any shape or keyword (s) form. Moreover, the use of capital letters by teacher number 6 didn't highlight the importance of any keywords in his typed query rather it was applied to all words in the query. These therefore, show that individual teachers made little or no use of characters and capital letters in their search queries.

The observational findings described above may or may not influence the search results of teachers. The returned search results of individual teachers would need to be investigated further to find out whether this is relevant or useful of basic search tools which is outside the scope of this thesis.

7.4 Search options used by the individual teachers

In this case study, the search sessions of thirty teachers are investigated for their use of search options via the revised search tool. The revised search tool consisted of twenty search options from which fifteen were adopted from the AltaVista's advanced search features and the remaining six options were classified as being 'Research in Progress' (Chapter 5; section 5.5, screenshot 6). The search options usage of teachers are summarised in table 25 below.

Search options	Number of times teachers selected (n=30)
Subject	28
Age Group	24
Resource Type	22
Free and/ Paid resources	22
Search results language	21
Follow-ups	19
Search results in one single page	16
Region	15
File Type	9
Student Type	9
Resources last updated/uploaded time	4
Video Type	3
Image Colour	3
Video Time	2
Image Size	2
Audio Time	0
Audio Type	0
Topic of the news	0
Date/Time of news	0
Source of news	0

Table 25 **The type of search options used by teachers via the revised search tool. The data represents the number of times a particular search option was selected by teachers.**

The above table shows that almost all teachers selected the search option 'Subject'. Search options 'Age Group', 'Resource Type', 'Free and/ Paid resources' and 'Search results language' were also frequently selected by teachers, in this case study (table 25).

Moreover, more than half of teachers selected the search options 'Follow-ups' and 'Search results in one single page'. Additionally, half of teachers selected the search option 'Region'. Finally, teachers did not select search options 'Audio Time', 'Audio Type', 'Topic of the news', 'Date/Time of news' and 'Source of news' (table 25).

7.5 Discussion on results obtained from teachers structured observations

In this case study, the majority of teachers considered them as having a lot of web and search engine experience but yet used little or no Boolean operators when searching online via the revised search tool (sections 7.3). Hence, findings obtained from teachers evaluation of the revised search tool, support Madden and colleagues' suggestion (unpublished work) that 'some' web users have difficulty in using Boolean operators for example, when using quotation marks, and that finding relevant online resources does not necessarily involve using long query terms or Boolean operators.

Findings also support Law et al. (2008) identification of teachers ICT obstacles. This include having 'Insufficient time for teachers to use ICT', 'Not enough digital educational resources for instruction' and 'Teachers' lack of ICT-skills'.

In this case study, the analysis of typed search keywords, show that teachers made little or no use of basic search tools in their search queries (as defined in section 7.3). Searching in 'Plain English' was used by one teacher only, whilst what seemed to be 'AND' searches, characters and/ or capital letters, were simply used by individual teachers as another keyword in their queries.

Findings show that advanced search options offered by the revised search tool (AltaVista search engine and 'Research in Progress' search options), were selected by many teachers when encouraged in task two of the structured observation. For example, advanced search options 'Search results language' and 'Search results in

one single page' were selected by 21 out of 30 teachers and 16 out of 30 teachers respectively, when searching online via the revised search tool (table 25).

Hence, this finding, further explains Spink et al. (2002) and Steinberg (2004) suggestions that most web users do not use any of the advanced search features that many search engines offer. Findings in this case study, showed that when advanced and teacher related search options are presented to teachers, all in one single page, teachers would make use of advanced search options.

Findings from individual teachers search sessions, showed that almost all teachers, used the search option 'Subject', with the majority of teachers using search options 'Age Group', 'Resource Type', 'Free and/ Paid resources' and 'Search results language'. In this case study, more than half of teachers, used search options 'Follow-ups' and 'Search results in one single page' together with half selecting the search option 'Region'. Finally, teachers did not use search options 'Audio Time', 'Audio Type', 'Topic of the news', 'Date/Time of news' and 'Source of news' (tables 25).

Therefore, it can be concluded that the search option 'Subject', followed by search options 'Age Group', 'Resource Type', 'Free and/ Paid resources' and 'Search results language' are the most frequently selected search options among teachers studied in this case study.

7.6 Results from teachers semi-structuredinterviews: Evaluation of the revised search tool

This section outlines the comments, recommendations and opinions of individual teachers about their online searching needs and practices. The data presented in this section are obtained from the semi-structured interviews that were carried out among thirty teachers in the second round of the case study (figure 8).

The results discussed will therefore, be used to further learn about the existing search practices of teachers within the context of the revised search tool. The interview transcripts of teachers and video clips (observations) can be found in appendix VII; sections F and G.

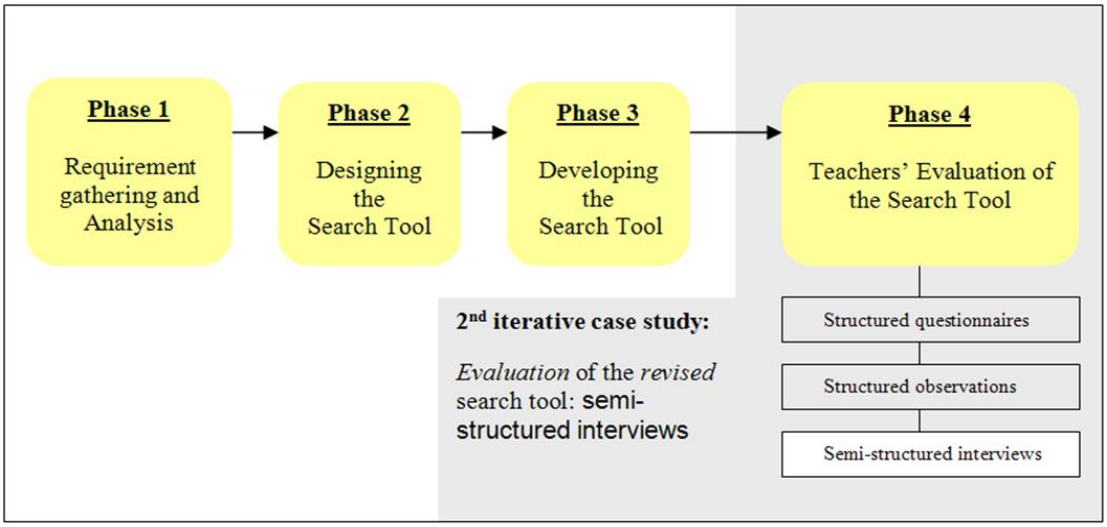


Figure 8 The evaluation of revised search tool by teachers using semi-structured interviews in phase four of the 2nd round of the case study.

In this case study, teachers were interviewed straight after completing their structured questionnaire and observation and the interview duration for each teacher varied. The time taken for individual teachers to evaluate the revised search tool that is to complete their observation and interview was between 9 to 38 minutes and, approximately between 5 to 15 minutes of this time was spent interviewing teachers.

The time variation stated above, was due to the fact that the interview of teachers were carried out straight after their observation of the revised search tool. Consequently, some teachers were not able to spend more of their school working time for a more extended interview session. However, the researcher was able to gain the adequate information from all teachers regarding their online searching practices and needs, as she was able to ask all her interview questions that were outlined previously in chapter 4.

7.7 Personal use of online resources by teachers

In the semi-structured interviews, individual teachers were asked about ways that online resources are incorporated into their teaching. Findings from the interviews report different approaches to the ways which selected online resources are used by teachers in classroom teaching. This included teachers creating and or modifying selected search results; presenting selected search results to students directly from the internet; reading and/ or saving useful information.

This finding is reflected by the fact that nineteen teachers (teacher numbers 1, 3, 6, 7, 8, 9, 11, 14, 15, 16, 18, 20, 22, 23, 26, 27, 28, 29 and 30) said they would create and or modify their selected search results into class 'handouts'. This practice was further described by teacher number 11:

> "If […] its a handout and I can use the questions for example I will just give it to the students […] If its notes [text] I might take it [,] copy paste and modify it and then give it to the students." (Teacher 11)

In addition, the search results selected by individual teachers were at times, presented to students directly from the internet, as six teachers (teacher numbers 3, 4, 5, 6, 11 and 14) said they would show relevant and or useful online resources to their students via a classroom projector or an interactive whiteboard. For example, teacher number 4, said that he will incorporate online resources into his teaching slides:

> "I do it as the class presentation only. If students demand [a] print-out then I send it by the email to them to save paper, because I have to be friendly, environmentally friendly." (Teacher 4)

Teacher number 5 said that she would display selected online resources in her class using an interactive whiteboard.

> "I like to find images and diagrams, um, videos of physics demonstrations, or um, a video of actual events […] [and] usually I put them on the screen [interactive whiteboard] also applets." (Teacher 5)

Furthermore, nine teachers (teacher numbers 4, 14, 15, 20, 24, 22, 25, 28 and 30) said, they would also read and or save useful information (online resources) onto their USB stick or computer hard drive for future use. This is reflected in comments from teacher numbers 4 and 14:

> "I click on it and I read through it actually and try to cut and paste whatever it was. If it's the whole thing I can save it onto my hard disk." (Teacher 4)

> "[…] I record the website on my USB and then I will go and show it on the interactive board." (Teacher 14)

In addition, thirteen teachers that is teacher numbers 6, 8, 9, 12, 13, 14, 15, 16, 18, 19, 25, 28 and 29 said they would bookmark, print or email their selected search results to themselves, to read later. For example, teacher number 8 said:

> "I bookmark it ASAP. If I'm at home I book mark it [or] if I'm at a college. If it's a brilliant result then I just print it out instantly to use it." (Teacher 8)

And, teacher number 14 said the following:

> "[…] I just get the case study and, um, print it out and then get it photocopied and read [;] the teacher's and the students [tasks and activities]." (Teacher 14)

Results from the interview transcripts, also highlighted restrictions associated with the online resource usages of teachers in their classroom, as teacher numbers 1, 2, 6, 7, 11, 13, 17, 23, 28 and 30 usages of online resources was restricted to their subject specifications, availability of online resources and or school's ICT equipment. For example, teacher number 2, explained that finding relevant and useful online resources is difficult due to the lack of specific resources for her subject on the web, in general:

> "[…] I think because […] religious studies is not you know something that there is a lot on in Google about anyway […] it's difficult to find because I'm looking for something very specific." (Teacher 2)

The online searching problem of teachers is further described by teacher number 7:

> "[…] two things I tell you, the tools are fine, but using these tools, what we get that depends on subject to subject […] my subject [Mathematics at Secondary level] is difficult and it is more time taking. Those [people] who work [create and/ design resources] on that subject don't leave that subject free [online] or they like to work for big organizations, so instead of just going individually, people [teachers] prefer to go to organisation Edexcel and all that, so we do get [online teaching] material from there." (Teacher 7)

Teacher number 6, also explained that his use of online resources (multimedia in general), is mainly subject to the availability of ICT equipment in the classroom:

> "It depends on the [school's] resources because we don't have over here interacting whiteboard. If I have an interactive whiteboard over here then I can display that one or import into the interactive whiteboard that it is very useful […] before that, where I was teaching, I was using the interactive whiteboard and there were two different software: 'Easy Teach' and 'Smart Board' and that was quite useful, easy for the copy and paste over there that saved images." (Teacher 6)

Finally, eleven teachers, that is teacher numbers 1, 6, 9, 13, 16, 20, 22, 26, 27, 28 and 29 said their online searching activities is often restricted by their teaching time. For example, teacher number 6 explained that:

> "[…] having a spare time to get [a] print out of everything [;] look at that one and then need to bring in the classroom you know it takes lot time." (Teacher 6)

And, teacher number 9 further highlighted the importance of teaching time in the following comment:

> "Its just a matter of time because every time you use the internet you sit down there and you have got to have time to do it." (Teacher 9)

Therefore, the interview report described above suggest that in this case study, the approaches taken by teachers to adopt selected online resources, in their classroom teaching, is different and restricted by individuals teaching time.

The following section of this chapter, will further discuss interview results obtained from the personal experiences of teachers using the revised search tool.

7.8 The personal experiences of teachers using the revised search tool

In the semi-structured interviews, individual teachers were asked to describe their personal search experience with the revised search tool. Further to the analysis of the thirty interview transcripts, two descriptions of the search experiences of teachers were identified:

1. Teachers considered the revised search tool (search options and features) useful and, suggested future improvements.
2. Teachers would only recommend the revised search tool to their colleagues, if they experienced reoccurring search successes.

These two descriptions are further outlined below and linked to the comments and suggestions of individual teachers.

7.8.1 Individual teachers considered the revised search tool useful and suggested future improvements

Findings from the interview transcripts of teachers showed that fourteen teachers liked the idea of the personalised search tool.

Teacher numbers 1, 2, 3, 4, 7, 11, 13, 15, 18, 20, 21, 23, 26 and 30 liked the idea of having a variety of generic (e.g. 'Audio Type' and 'Video Time') and teacher related search options (e.g. 'Subject' and 'Age Group'), all in one page. For example, teacher number 1 said:

> "I think this such engine [the revised search tool] is very nice [,] it seems very encouraging because it is very structured which means that it gives you the chance of narrowing down your search and you can get something straight away like stuff like um you know the type of student that has special needs or talented [search options available in the revised search under the category 'student type'] we don't usually find this on Google or AltaVista so that's very interesting and you have got the option of the video or the rest of them big options that was very nice as well I quite like that yeah and it seems quite simple to use even thought there is lots of I can see a lot of things but it's not a problem it's quite simple." (Teacher 1)

And search options 'Image size' and 'Image colour' was enjoyed by teacher number 2:

> "[with the revised search tool] […] you got video option, things like that, I think that's good. You know you are very limited in Google, you search for images or you search for documents so this gives you the option of doing both [search options are displayed all in one page] which is a good thing." (Teacher 2)

Eight teachers, that is teacher numbers 2, 5, 6, 7, 10, 11, 14 and 19 had difficulty understanding or using the search options 'Region' and 'Age Group'. These teachers described their inability in selecting the most appropriate category/option from the drop-down menus. For example, the problem associated with the categorization of the search option 'Region', was described by teacher number 5:

> "With regards to science the national curriculum doesn't change drastically between regions, because it is pretty much the same everywhere. So, I really wouldn't have much use for these." (Teacher 5)

Additionally, the problem with using the 'Age Group' sub-categories (search option), was explained by teacher number 6:

> "I think there is a gap over here […] for GCSE they [the revised search tool] should need to mention it [say it is] for GCSE, [same for] for A-level or if I'm looking more [higher] than A-level I think they [the category of 'Age Group'] need to [change this to] [...] key stage 3 […] [Furthermore] GCSE […] [should change to] key stage 4, [and] A-level is key stage 5." (Teacher 6)

Twelve teachers, that is teacher numbers 1, 5, 8, 11, 14, 22, 23, 25, 26, 27, 28 and 29 disliked the current layout, flexibility and visibility of the revised search tool (chapter 5; section 5.5.1, screenshots 5 and 6). These teachers recommended the researcher to *group search options* into separate sections or into boxes; to *distinguish between the selected search options* of individual teachers and the default settings of the revised search tool using different colours. In addition, teachers suggested to *display relevant search options only*, that is recognizing the teaching level of individual teachers e.g. primary level and, to eliminate unwanted search options from the revised search tool's interface, accordingly.

Teachers liked to use a more flexible, adaptable and colourful search tool. This included the layout, background colour, logo and search items spacing of the revised search tool. Additionally, teachers liked to choose categories 'Lesson Plan' and 'Animation' simultaneously from the search option 'Resource Type' (drop-down list). For example, teacher 8 said the followings about the revised search tool:

> "It's very confusing, it looks very confusing I mean I'm 24, I'm ok with something like this, I would give time but if I was 44 probably I would just say no thank you very much I'm not bothered […] it's a bit messy this spacing is not very good […] I would definitely work on the one you know like I would make it look more sophisticated […] it's very plain it looks like you know for example a very unprofessional site […] definitely spacing there is a problem with spacing […] I would write nice things about this site [the revised search tool] here and here with animation […] I would use colours to look better you know use colours." (Teacher 8)

Using the hide/show effect to display search options, was suggested by teacher number 1:

> "[…] I don't think it's [the search options displayed in the revised search tool are] too much maybe you can devise a way of um like not having everything come up at the same time […] so maybe initially it can be just the basic [search options] and then it goes either more or less something like that but otherwise it seems ok." (Teacher 1)

Colour coding search options was also recommended by teacher number 11:

> "[…] there could be another option where I clicked on something like for example if I click on educational sites the colour, maybe, could change so when I am searching again [for every time that I click on the search button] I can see [my selected search options] this is highlighted and I have clicked on this previously." (Teacher 11)

Furthermore, *adding choice of 'Arabic' language* to the search option 'Show search results in any language' was recommended by teacher numbers 27 and 28. Other search features proposed by teachers, was to add the *search option 'exam papers'*; to *re-grouping the subject 'Business and Economics'* into three different subjects that is (i) 'Business', (ii) 'Economics' and (iii) 'Marketing' (teacher number 14) and, to add a *new subject called 'Psychology'* (teacher number 10). Teachers also wanted to *select more than one option from the drop-down menus* (mostly from the search option 'Resource Type') and, to include *'applets', 'clip art'* and *'interactive activity'* to the search option 'Resource Type' (teacher numbers 5, 22 and 28). For example, teacher number 22 explained that:

> "[…] some resources [...] you can use to help you plan [...] and there are some resources where you can actually get the children directly involved physically involved that's interactive ones I am talking about." (Teacher 22)

Finally, teacher number 15 proposed to have an online personal storage space. She wanted the revised search tool to store her selected search options and returned results so that she could re-access them or share with other teachers. The following is the recommendation by teacher number 15:

> "[...] it would be lovely if there there was something where that we can access and account to keep like a personal journal […] So we can actually re-access that again and delete it when not needed you know when it's not applicable and whoever else needed for future reference can actually access that as well […] [i.e.] website teaching material found." (Teacher 15)

7.8.2 Teachers willingness to recommend the revised search tool to their colleagues was linked to their individual search success

In this case study, individual teachers' continues usage of the revised search tool was report to be linked to re-occurring search successes. It should be noted that before, interviewing teachers, the researcher informed teachers that the purpose of this case study is to learn about the online searching needs and preferences of individual teachers and not the revised search tool. Hence, teachers were encouraged and were indeed made comfortable to criticize the personalised search tool.

Findings from the interview transcripts, also suggested that continues usage and indeed recommendation of the revised search tool is mostly linked to teachers

finding their relevant and useful online teaching resources. Eleven teachers that is, teacher numbers 2, 3, 4, 6, 8, 9, 11, 17, 18, 23 and 30 reported that they would recommend the revised search tool to their colleagues, if they experience reoccurring search successes. This need is reflected in comments by teacher numbers 2 and 8:

> "I would say the most important thing is getting what you're looking for [,] I mean even though I gave, you know, a lot of criticism about the look and feel of it [the revised search tool] but still that's tolerable if you know at the end of the day [that] you get what you want so yeah […] then I would, I would, yeah I would recommend it." (Teacher 8)

> "I would want to use it a lot more myself and see you know what sort of thing comes up with and you how much it will be useful to me and start using it myself before I start recommending it." (Teacher 2)

Furthermore, five teachers, that is teacher numbers 2, 5, 22, 28 and 29 said it would be inappropriate for them to search online, if the revised search tool was used entirely on its own. Teachers explained that they didn't want to restrict themselves to one particular set of search results but wanted to have access to all possible and or potential online resources (search results) that is to take charge in filtering their search results. For example, teacher number 5 said:

> "I think that I would enjoy using this search engine, um, in conjunction with other search engines. Perhaps I could use it sometimes but not rely on it entirely because sometimes you want to just find everything yourself and make your own decision […] I think it would be very useful especially for someone who did not have a lot of experience with the internet or was perhaps new to the internet, that way they wouldn't have to worry about how to filter out unwanted results. Perhaps someone who did not grow up ever seeing a computer and is using them for the first time or people again who are very rushed I think that would, those would be good people, or maybe students also because it filters out inappropriate material." (Teacher 5)

Additionally, teacher number 14 recommended using 'popular' teaching websites as an extra search option, to the revised search tool:

> "I think what would be useful is to have popular websites for primary, secondary and post-compulsory level, you can put in your subject and it can take you to the most popular websites. For example, KS3 and it takes you to related teaching websites." (Teacher 14)

Hence, further to teachers' evaluation of the revised search tool, a research prototype and their reports, it is suggested that teachers would be willing to continue their use

of the search tool's search options and features, only if, the returned search results were also useful. Moreover, such search tools could be made more useful to teachers, if returned search results were retrieved from their selected search engine repositories (websites) and or databases.

7.8.3 Teachers formal training in internet searching

In the semi-structured interviews, individual teachers were asked if they had any formal training in internet searching. In this case study thirty teachers report to have *little or no formal training* in internet searching. For example, teacher numbers 5 and 23 made the following comments about their web searching skills:

> "um, well I remember the year I went to university, was the first year they actually had the graphical interface for internet, as opposed to the text phase, which I kind of explored just because I was interested in that sort of thing, but it was mostly for research, like, scientific research. Someone showed me the search engine page and said you type in what you want there, then just push [press] search, and that was how it started really." (Teacher 5)

Teacher number 23 also commented on her formal internet training by saying the following:

> "No not formal [training], not that I remember. No not that I remember at all I think it's just trial and error." (Teacher 23)

Overall, all the thirty teachers interviewed in this case study reported to had little or no formal training in internet searching. The online searching skills of teachers were mostly acquired or developed through their 'trial and error'.

7.9 Discussion on results obtained from teachers semi-structured interviews

In this case study, online searching activities of teachers reported that there were restricted by their teaching time, subject specification, availability of online resources, and or school's lack of ICT equipment (section 7.7).

Teachers reported their *liking of using and or accessing a variety of generic and teacher related search options, all in one page*. In this report, teachers also

recommended having a *specialised list of sub-categories* for practitioners teaching UK syllabus. For example, the search option 'Show search results in any language' should include the 'Arabic' language and for the search option 'Resource Type' to include 'applets', 'clip art' and 'interactive activity' (section 7.8.1). Teachers also wanted to *distinguish between their selected search options* and that of the search tool's default settings; and, for the personalised search tool to *offer flexibility in the number of categories a teacher can choose* from a drop-down list, at any one time (section 7.8.1).

Storing and sharing the search history or search results of teachers, was the other search option recommended by teachers (section 7.8.1). In addition, some teachers said they would also like to have their returned search results retrieved from other educational websites and or databases (section 7.8.2).

The need for creating a simple and clear search tool was also highlighted in this case study. Teachers reported having little or no formal training in internet searching, as the online searching skills of teachers, were found to be mostly developed through 'trial and error' (section 7.8.3). Hence, underling teachers need to use search options and features effortlessly.

This finding challenges BESA (2009) reports on the improvement of the number of school teachers (primary and secondary) receiving ICT training. Additionally, this finding is in line with Ofsted (2005) report, concerning the lack of ICT training of teachers; Henry (2005) third theme entitled 'Learning technology' about teachers learning to search the internet using 'a trial and error approach'; Madden et al. (2005) survey of the internet usages of head teachers and, finally, Law et al. (2008) survey that ranked teachers lack of ICT skills, as the seventh ICT obstacle of schools (chapter 2, table 1). However, findings from the interview transcripts **does not provide enough evidence** to suggest that, teachers lack of formal training in internet searching is indeed an ICT obstacle to their search for online resources.

7.10 Conclusions

In this chapter, teachers report and results obtained from both the structured observations and semi-structured interviews were discussed within the context of previous studies. Furthermore, the kind of personalised search options and features

teachers used and prefer to have, when searching for online teaching resources via the revised search tool was outlined.

For example, in this chapter, search options 'Subject', 'Age Group', 'Resource Type', 'Free and/ Paid resources' and 'Search results language' were highlighted as the kind of search options that teachers used to personalised their online search. Reports obtained from the thirty interview transcripts of teachers also enabled the researcher to learn about the web search preferences of teachers when searching online via the revised search tool.

Findings from this chapter have therefore helped with answering two of the thesis research sub-questions that were previously outlined in chapter 3 of this thesis:

1. Which options and features do teachers use when searching online via the revised search tool?

2. What were the preferences of teachers in relation to personalised searching?

Finally, adapting the System Development Life Cycle (SDLC) methodology iteratively has resulted in the researcher learning about some of her methodological limitations. In this case study, the thirty teacher participants were interviewed (semi-structured interviews) straight after completing their individual observation of the revised search tool. The researcher made this arrangement in order to ensure having a fixed number of teachers in all phases of the System Development Life Cycle methodology.

This planning however, restricted the researcher from analysing data obtained from the structured observations of the revised search tool prior to interviewing teachers and, thus exploring future arsing patterns or questions. For example, if she was able to analyse observational data before interviewing teacher numbers 3, 26 and 4 about their use of characters and capital letters, she could have indeed ask these teachers, if adding characters and or capital letters in their search query had influence their returned search results in past searches (section 7.3.2).

Hence, I have learn that if my research design was planned differently, that is semi-structured interviews were carried out after analysing data from teacher's observation of the revised search tool, I could have (a) use findings from the observation surveys

to further guide my interview design and, (b) would have been able to use the interview data to explain arsing patterns or issues found in earlier results.

The following chapter of this thesis will be the concluding part of this case study. In the next chapter, a model of teachers' web information needs and search behaviour is also offered in order to make web searching easier for teachers in the future.

Chapter 8

Conclusions

In this chapter, the case study's findings are discussed within the context of the research question. The research contribution to knowledge is outlined next together with limitations of the case study and its related future works.

8.1 Overview

This thesis has investigated the search options and features teachers use and prefer to have, when personalising their online search for teaching resources. This study focused on making web searching easier for UK teacher practitioners at primary, secondary and post-compulsory levels.

In this thesis, the case study design was selected using a triangulated mixed methods and a 'System Development Life Cycle' (SDLC) methodology approach was carried out in a two phase iterative case study that involved 75 teachers. This included the design, development and testing of two versions of an experimental search tool called "PoSTech!".

The following sections of this chapter will begin by answering the thesis two research sub-questions in section 8.2. Next, the model of teachers' web information needs and search preferences is depicted in section 8.3. This model is described as

the case study's main contribution to knowledge. Lastly, the limitations and future work of the case study is discussed in section 8.4.

8.2 Search options and features teachers used and preferred to have

In this section, a list of search options and features used and preferred by individual teachers, when using the revised search tool are described in order to answer the two research sub-questions outlined in chapter 3 of this thesis.

The case study, research question was *"What options and features are required by teachers to personalise their search for online teaching resources?"* using the following two research sub-questions:

1) Which options and features do teachers use when searching online via the revised search tool?

2) What were the preferences of teachers in relation to personalised searching?

It is important to remind the reader that in this thesis, a *search option* is one which is chosen or selected by the teacher and a *search feature* is the characteristic and or quality of an option that a teacher experiences when using a particular option.

8.2.1 Search options and features currently used by teachers

In the second round of the case study, teachers were found to have used the following search options and features when searching online for teaching materials via the revised search tool, PoSTech (chapter 7, section 7.3):

1. Teachers used search options 'Subject', 'Age Group', 'Resource Type', 'Free and/ Paid resources' and 'Search results language'.
2. Teachers typed search keywords in English (everyday informal spoken language) to construct their individual search queries, rather than using a combination of keywords and basic search strategies, such as 'AND' searches, characters and/ or capital letters together (chapter 7, section 7.4); and,
3. Teachers liked the idea of displaying a variety of generic (e.g. 'Search results language' and 'Image Colour') and teacher related search options (e.g. 'Subject' and 'Age Group') all in one page, as compiled in the revised search tool.

However, it should be added that the inclusion of the above, generic and teacher related search options *should not create a cluttered interface* or indeed force individual teacher to choose search options.

In this case study, teachers reported their need to freely choose the search options they want to use by means of adding and or removing selected search options from the search tool or to make their pre-selected search options visible from the search engine's default settings. Additionally, adding or removing search options should allow individual teachers to have control over their preferred level of personalisation or restrictions imposed on the returned search results.

As an example of how this case study have contributed to teachers' web searching needs field of work (on-going research) is that findings described above highlights and indeed emphasises on Wishart and Oades (2003) identification of users' needs and characteristics for educational portals, which was the need to create search engines that have a clear and simple interface design. Hence, suggesting that the findings of Wishart and Oades (2003) still remain relevant to teachers' online searching needs, even after ten years.

This work therefore contribute to the second round of the case study, where individual teachers preferred to use search tools/engines that has a clear and simple interface and, search options relevant to their teaching. For example, when using the revised search tool, teachers experienced difficulty in understanding or using the search options 'Region' and 'Age Group' and, thus suggested for these options to be made more clear. Teachers also disliked the layout, flexibility and or visibility of the revised search tool. This included the way in which search options were grouped, displayed and made available to individual teachers for their online searching (chapter 7; section 7.8).

8.2.2 Preferences of teachers in relation to personalised searching

In the second round of the case study, teachers said they preferred to have the following personalised search options and features, when interviewed within the context of the revised search tool (chapter 7, section 7.9):

- To have a search feature that can group related search options into separate sections or boxes for teachers to view.

- To have a search option that contains a specialised list of sub-categories, e.g. adding ‘applets’, ‘clip art’ and ‘interactive activity’ to the search option ‘Resource Type’.

- To have a search option that stores the search history and or search results of individual teachers.

- To have a search feature that can visually highlight (colour code) teachers selected search options from default settings of the search tool.

- To have a search feature, that enables teachers to select more than one option from the drop-down menus (mostly from the search option ‘Resource Type’), simultaneously. And,

- To have a search option, that allows teachers to search via ‘popular’ teaching websites.

8.2.3 Teachers’ recommendations in the interviews and analysis of their profile

In this thesis, two other search features were also proposed that wasn’t initially planned in the research sub-questions, outlined in this thesis. The first recommendation was made by teachers’ in the interviews (chapter 7, section 7.5) and the second recommendation was drawn from teacher’s profile (paper questionnaires) analysis (chapter 6):

1. To have a *search feature* that assists individual teachers with their use of selected online resources in the classroom teaching. Teachers should be able (i) to create and or modify online resources; (ii) to show their selected/preferred website(s) to students via the search tool; and, (iii) to read and or save useful information directly from the internet.

2. To have a *search feature* that is capable of collecting and profiling the demographic information and experiences of individual teachers.

In this thesis the demographic information and experiences of teachers related to teachers age, gender, level of education they worked in, subject, teaching experience, web and search engine experience.

The two search features recommended in this section, can be used by search engine designers or developers to further learn about the online searching needs and

practices of teachers. For example, search engines could generate user profiles that can store the demographic information and experiences of individual teachers against their search practices and selected search results. This information can then be used to analyse teachers browsing history against their individual demographic information and experiences. In addition, the above recommendations can be used by other researchers to further investigate factors influencing the online searching behaviours of teachers.

Furthermore, in this case study, Wishart and Oades's (2003) other recommended search features like the inclusion of a personalised greeting messages and removing scroll bars from web pages were not raised by teachers. However, these minor points (teacher's preferences) can easily be addressed when designing the search tool's homepage, for teachers.

8.3 Research contribution to knowledge

This case study has contributed to knowledge by offering a model of teachers web information needs and search behaviour, in order to make web searching easier for teachers in the future (model 1). In this thesis, a case study of teachers using a triangulated mixed methods and a 'System Development Life Cycle' (SDLC) methodology approach was carried out in a two phase iterative case study that involved 75 teachers.

Findings from this case study showed that almost all teachers selected the search option 'Subject'. Search options 'Age Group', 'Resource Type', 'Free and/ Paid resources' and 'Search Results Language' were also frequently selected by teachers, in this case study. Moreover, more than half of teachers selected the search options 'Follow-ups' and 'Search results in one single page' with half of the teachers selecting the search option 'Region' (table 26).

Search Options selected by teachers
Subject
Age Group
Resources Type*
Free and/ Paid Resources**
Search Results Language
Follow-ups**
Search results in one single page

* Multiple selections of sub-categories is permitted or required.
** Search option is solely derived from the case study results.

Table 26 Search options required by teachers to personalise their search for online teaching resources.

The least selected search options were identified as being 'File Type', 'Student Type', 'Resources last updated/uploaded time', 'Video Type', 'Image Colour', 'Video Time', and 'Image Size'. Finally, teachers did not select search options 'Audio Time', 'Audio Type', 'Topic of the news', 'Date/Time of news' and 'Source of news' (chapter 7, table 24).

Findings from this case study also reported five search features recommended by teachers: a search feature that can store search options selected by individual teachers and their returned results; a search feature that contains a specialised list of sub-categories; a search feature that can visually highlight and display teacher's selected search options; a search feature that teachers can use to select more than one option from the drop-down menus, simultaneously and; a search feature that teachers can use to search via popular or other known educational websites (chapter 7, section 7.8). Hence, a model of teachers' web information needs and search behaviour is offered using the seven search options (in order of popularity) and five search features, used by teachers to personalise their search for finding online teaching resources, when searching via the revised search tool mentioned above. This model exemplifies a range of search options and features and how they interrelate. The relationship depicted between search options and features can help us understand

preferences of the user to make web searching easier for teachers in the future (model 1).

Search options selected	Search features recommended by Teachers				
Search Features / Search Options	Store search options selected by individual teachers and their returned results	Contain specialised list of sub-categories	Visually highlight and display teacher's selected search options	Select more than one option from the drop-down menus, simultaneously	Search via popular or other known educational websites
Subject	✓	✓	✓	-	✓
Age Group	✓	✓	✓	-	✓
Resources Type*	✓	✓	✓	✓	✓
Free and/ Paid Resources**	✓	-	✓	-	✓
Search Results Language	✓	✓	✓	-	✓
Follow-ups**	✓	-	✓	-	✓
Search results in one single page	✓	-	✓	-	-

* Multiple selections of sub-categories is permitted or required.

** Search option is solely derived from the case study results.

Model 1 **Teachers' model of web information needs and search behaviour, listing the kind of search options and features required by teachers to personalise their search for online teaching resources.**

In this thesis, individual teachers were asked to perform two search tasks using the revised search tool that consisted of twenty search options (chapter 7).

Finally, it should be highlighted that in practice the success of achieving a personalised search tool/engine that is the design and development of all the search options and features teachers used and recommended, as well as the search features recommended by the researcher (described in section 8.2.1-8.2.3), would very much depend on the availability of relevant online resources, school's ICT equipment, government's funding for schools to have free access to online resources and, advancements in search engines and or web browsers technologies.

Hence, teachers' model of web information needs and search behaviour can be useful to search engine designers or inventors who are actively working on the design and development of personalised search engines, as the teachers' seven used search options and the five recommended search features can help developers to better understand the online searching needs and preferences of teachers, as well as profiling the web searching needs and behaviours of individual teachers.

For example, inventors Haveliwala, et al. (2010) has patented the ‘Variable Personalization of Search Results in a Search Engine’. The aim of this design is to personalise the returned search results of Google for online searchers. In their patent application publication, an interface design for 'Google Personalized Search' is depicted that offers web users (Googlers in particular) the choice to personalise his or her search using the 'Create Profile' search option. As a second example, inventors Parikh, et al. (2013) recently patented the ‘System and method for multi-dimensional personalisation of search results’, which is intended to allow users to personalise their online search results via a user interface design. Hence, the teachers’ model of web information needs and search behaviour can be used by the inventors to build their personalised interface for teachers too.

In this thesis, information about the kind of search options and features, required by teachers to personalise their search for online teaching resources, can also be useful to researchers from other related disciplines. For example, researchers Özpolat and Akar have recognised three of my earlier research papers relating to this case study. Since, Drs Özpolat and Akar from the Electrical and Electronics Engineering department in Middle East Technical University Ankara, Turkey, have cited Seyedarabi et al (2005), Seyedarabi (2006) and Seyedarabi (2008) in their 2009 research paper entitled "Automatic detection of learning styles for an e-learning system". Additionally, findings from this thesis can be useful to those researchers who are working in the field of Information Retrieval, Semantic Web, Ontology, Web Personalization, User Profile, Personalized Search and or Personalised Ontology. This includes academics like Sridevi and Dr. Umarani who have recently conducted a survey of 'Web Personalization Approaches', mainly to gain further insight into teachers’ web information needs and search behaviour. In this survey, the importance of web personalisation and the need for *Personalisation* of *Web Search Results* according to individual users’ needs and preferences was highlighted and explained:

> “[…] the task of retrieving the only required information keeps becoming more and more difficult and time consuming. To reduce information overload and create customer loyalty, Web Personalization, a significant tool that provides the users with important competitive advantages is required. A Personalized Information Retrieval approach that is mainly based on the end user modelling increases user satisfaction.” (Sridevi and Umarani, 2013, page 1538)

Details about the seven search options and five search features listed in the teachers' model of web information needs and search behaviour (model 1) are provided in the remaining part of this section:

(1) Search option 'Subject'

In this case study, the option 'Subject' was selected by 28 teachers (out of 30 teachers) when searching online via the revised search tool (chapter 6, table 18). This search option was initially added to the revised search tool, as it was mentioned to be useful by teacher numbers 3 (question seven and question eighteen), teacher 23 and 24 (question eighteen) in the paper questionnaire. This paper questionnaire was carried out in phase one of the 1st round of the case study that is 'Requirement gathering and Analysis' (appendixes II and VII).

Hence, the search option 'Subject' consisted of the following sub-categories that were mainly derived from the teacher training PGCE (Postgraduate Certificate of Education) prospectus at the Institute of Education (appendix VIII and IX). Sub-categories included for this search option are:

- Art & Design
- Business & Economics Education
- Citizenship
- English
- English with Drama
- Geography
- History
- Information & Communications Technology
- Mathematics
- Modern Foreign Languages
- Music
- Religious Education
- Science
- Social Science with Humanities
- Any Subject (*default option*)

The reason for using teacher training PGCE prospectus at the Institute of Education was because the researcher needed the subject sub-categories for the design and development of the search tools but she realise that other categories would have been possible.

(2) Search option 'Age Group'

In this case study, the option 'Age Group' was selected by 24 teachers (out of 30 teachers), when searching online via the revised search tool (chapter 6, table 18). This search option was initially added to the revised search tool, as it was mentioned to be useful by teachers numbers 3 (in question eight), teacher 2, 3, 4, 6, 8, 16, 17, 23, 25 and 26 (in question eighteen), which also included results obtained from question sixteen, in the earlier paper questionnaires (appendix VII). This paper questionnaire was carried out in phase one of the 1st round of the case study that is 'Requirement gathering and Analysis' (appendix II). Hence, the search option 'Age Group' consisted of the following sub-categories that were mainly derived from educational websites like the www.schoolzone.co.uk as well as referring to school textbooks at primary, secondary and post-compulsory levels (appendix VIII and IX):

- Preschool (3-5 years old)
- Year 1 & 2 (5-7 years old)
- Year 3 (7-8 years old)
- Year 4 (8-9 years old)
- Year 5 (9-10 years old)
- Year 6 (10-11 years old)
- Year 7 (11-12 years old)
- Year 8 (12-13 years old)
- Year 9 (13-14 years old)
- Any Age Group (*default option*)

(3) Search option 'Resource Type'

In this case study, the option 'Resource Type' was selected by 22 teachers (out of 30 teachers) when searching online via the revised search tool (chapter 6, table 18).

The search option 'Resource Type' was initially added to the revised search tool as it was mentioned to be useful by teacher numbers 18 (in question seven), teacher 7 (in question eight), teacher 6, 9, 12, 13, 15, 18 and 19 (in question eighteen) and results obtained from question eleven, in the earlier paper questionnaires (appendix VII). This paper questionnaire was carried out in phase one of the 1st round of the case study that is 'Requirement gathering and

Analysis' (appendix II). Sub-categories included for this search option are (appendix VIII and IX):

- Animations
- Audios
- Bibliographic
- Books
- Diagrams
- Dictionary
- Games
- ICT Activities
- Jokes
- Lesson Plans
- Maps
- News
- Paintings
- Pictures
- Poems
- Songs
- Stories
- Tables
- Text
- Videos
- Any Resource Type (*default option*)

Under the search option 'Resource Type', sub-categories 'Bibliographic', 'Dictionary' and 'News' were derived from Google books (Poremsky 2004; Calishain and Dornfest 2005). Moreover, sub-categories Paintings (Art), Poems (English), and Stories (English) were also added by the researcher using other related educational websites, like the www.primaryresources.co.uk.

(4) Search option 'Free and/Paid Resources'

In this case study, the option 'Resource Type' was selected by 22 teachers (out of 30 teachers), when searching online via the revised search tool (chapter 6, table 18). Search option 'Free and/Paid Resources' was initially added to the revised search tool as it was mentioned to be useful by teacher numbers 28 (question eight), teacher 18 and 28 (question eighteen) in the paper questionnaires that was carried out in phase one of the 1st round of the case study that is 'Requirement gathering and Analysis' (appendixes II and VII). Hence, the search option 'Free and/ Paid Resources' consisted of the following sub-categories (appendix VIII and IX):

- Free
- Paid
- Looking for ‘Free’ and/ ‘Paid’ resources (*default option*)

(5) Search option 'Search Results Language'

In this case study, the option 'Search Results Language' was selected by 21 teachers (out of 30 teachers) when searching online via the revised search tool (chapter 6, table 18). This search option was derived from Google’s advanced search preferences using three of the main languages that are currently taught in the UK syllabus. This paper questionnaire was carried out in phase one of the 1st round of the case study that is ‘Requirement gathering and Analysis’ (appendix II).

Hence, the search option 'Search Results Language' consisted of the following sub-categories (appendix VIII and IX):

- English
- French
- German
- Show search results in any language (*default option*)

(6) Search option 'Follow-ups'

In this case study, the search option 'Follow-ups' was selected by 19 teachers (out of 30 teachers) when searching online via the revised search tool (chapter 6, table 18). This search option was initially added to the revised search tool as it was mentioned to be useful by teacher numbers 7 (question seven), teacher 13 and 14 (question eight), teacher 9 (question eleven), teacher 3 (question fifteen), teacher 4,5,6,7,10,13,29 and 30 (question eighteen) in the paper questionnaire, which was carried out in phase one of the 1st round of the case study that is ‘Requirement gathering and Analysis’ (appendixes II and VII).

Hence, the search option 'Follow-ups' consisted of the following sub-categories (appendix VIII and IX):

- Worksheet
- Homework
- Both
- No follow-ups (*default option*)

In the 'Follow-ups' search option, the sub-category 'Homework' was included by the researcher, when testing the revised search tool. Hence the option ‘worksheet’ was considered to be an in-class activity and ‘homework’ was a post-class activity for teachers to choose, when searching via the revised search tool.

(7) Search option 'Search results in one single page'

In this case study, the option 'Search results in one single page' was selected by 16 teachers (out of 30 teachers) when searching online via the revised search tool (chapter 7, table 25). This search option was derived from Google books (Poremsky 2004; Calishain and Dornfest 2005). Hence, the search option 'Searching results in one single page' consisted of the following sub-categories for teachers to choose when viewing their retuned search results (appendix VIII and IX):

- 2
- 3
- 4
- 5
- 10
- 15
- 20
- 25
- 30
- 35
- 40
- 45
- 50
- 100
- Show ‘All’ of my search results in one single Page (*default option*)

In this case study, the model of teachers’ model of web information needs and search behaviour also consisted of five search features (chapter 7, section 7.9) that are further described below:

(1) Store search options selected by individual teachers and their returned results

The need to store individual teachers’ search options was added to the model of teachers web information needs and search behaviour (model 1) as in this case

study, teacher number 15 reported she would like to be able to capture and share her selected search options as well as the returned search results, respectively (chapter 7, section 7.8.1).

(2) Contain specialised list of sub-categories

The need to contain specialised list of sub-categories was added to the model of teachers web information needs and search behaviour (model 1) as in this case study, teacher numbers 27 and 28 wanted to have the 'Arabic' language added to the search option 'Show search results in any language'.

In this case study, teacher number 14 also wanted the subject 'Business and Economics' to be re-grouped into three different subjects that is (i) 'Business', (ii) 'Economics' and (iii) 'Marketing' and, teacher number 10 wanted to add 'Psychology' to the 'search option 'Subject'. Lastly, teacher numbers 5, 22 and 28 wanted to include 'applets', 'clip art' and 'interactive activity' to the search option 'Resource Type' (chapter 7, section 7.8.1).

Additionally, teacher numbers 2, 5, 6, 7, 10, 11, 14 and 19 said they had difficulty understanding or using the search options 'Region' and 'Age Group' as they were unable to find their appropriate teaching level from the 'Age Group' drop-down menu or indeed to see the usefulness of selecting the search option 'Region' (chapter 7, section 7.8.1).

Indeed, another way of personalising sub-categories would have been to allow teachers to adapt search options themselves for example, placing an empty box for individual teachers to add alternatives or their taught subject.

(3) Visually highlight and display teacher's selected search options

The need to visually highlight and display teacher's selected search options was added to the model of teachers web information needs and search behaviour (model 1) as in this case study, teacher number 11 said she would like to be able to distinguish between her selected or previously visited search options, when searching via the revised search tool (chapter 7, section 7.8.1). The need of this particular teacher could also be replicated and applied to other search options that have multiple sub-categories.

(4) Select more than one option from the drop-down menus, simultaneously

The need to select more than one from the drop-down menus simultaneously was added to the model of teachers web information needs and search behaviour (model 1) as in this case study, teacher number 8 wanted to search for multiple sub-categories that are 'Lesson Plan' and 'Animation', when using the search option 'Resource Type' via the revised search tool (chapter 7, section 7.8.1). Indeed the need of this particular teacher could also be replicated to other search options that have multiple sub-categories in order to allow teachers to make multiple search queries. For example, a French teacher could search for worksheets in both English and French language.

(5) Search via popular or other known educational websites

The need to search via popular or other known educational websites was added to the model of teachers web information needs and search behaviour (model 1) as in this case study, teacher number 14 wanted to search and retrieve her search results via other popular websites too, when searching online for teaching resources (chapter 7, section 7.8.1).

The need of this particular teacher, relates to the search option 'Subject', and indeed could be applied for other search options in the revised search tool (model 1). For example, an individual teacher could search via popular websites using the search options 'Age Group', 'Resource Type', 'Free and/ Paid Resources', 'Search Results Language' and 'Follow-ups'.

In conclusion, the research work presented in this thesis, provides the initial and important steps towards understanding the web searching information needs and search behaviour of teachers, working in the UK educational setting. The *compilation of search options and features that teachers used and prefer to have* when searching online via the revised search tool for teaching materials, can be used by search engine designers and developers in order to provide teachers with the kind of search options and features they need when personalising their online search for teaching resources.

Moreover, teacher trainers, in particular, can use the information and results obtained from this case study to improve teacher training programs, mainly when training and

or advising individual teachers about best practices for web searching that is when searching for online resources at technology level. The online searching skills, needs and practices of teachers can further be improved e.g. through the design and development of personalised search tools/engines and relevant teacher training programmes.

The final section of this chapter, will discuss limitations of the case study followed by outlining future research work and recommendations for prospective researchers, the UK government and software designers, respectively.

8.4 Limitations and future work

In this thesis, the data were collected using three research instruments and the design of two search tools, which were carried out iteratively. In each round of the case study, research instruments and the search tool were made more sophisticated, refined and or re-developed (chapter 4; section 4.5, figure 2) that had both advantages and disadvantages.

The **advantages** are that *firstly*, data was drawn from 75 teachers, using three different types of research methods that are structured questionnaires, observations and semi-structured interviews. *Secondly*, in this case study, two versions of the search tool (a prototype retrieval system) was developed.

Hence, at each phase of the System Development Life Cycle (SDLC) methodology findings were built on results obtained in preceding phases. In this methodology, *phase 2* 'Designing the Search Tool'; *phase 3* 'Developing the Search Tool'; and, *phase 4* 'Teachers' Evaluation of the Search Tool' were all repeated twice.

Repeating phases 2, 3 and 4 of System Development Life Cycle enabled the researcher to revise and refine her research instruments and the search tool. In addition, the design and development of the first and the revised search tool enabled the researcher to *display search options and features* to individual teachers by using a physical artefact. Lastly, the SDLC adopted in this case study, can be used by researchers from different disciplines, the government, search engine designers and developers to investigate different groups of web users information needs and search behaviours.

In this case study there were also **limitations.** Firstly, the researcher is aware that *collecting additional data* would be useful to further develop the analysis in this research. For example, to include more male teachers, more primary teachers and secondary teachers, in each round of the case study. However, having a fixed number of teachers in all phases of the research System Development Life Cycle methodology was very difficult as participation of individual teachers was on voluntary basis and that the researcher did not have the funding to pay teachers for their time and contribution (chapter 4; section 4.6).

Secondly, findings obtained in this thesis, *cannot be generalised to English teachers*, teaching UK syllabus as results are representative of the individual teacher participants who were from two primary schools in London, one primary school in Kent, three secondary schools in London and two post-compulsory schools in London. Moreover, observations of individual teachers was carried out in an artificial setting and not in their natural setting, teachers were asked to carry out two search tasks via the revised search tool that does not reflect on their day to day practice.

Finally, the revision of the research instruments and the search tool in particular, was very time-consuming for the researcher, which consequently led to *teachers discontinuing their participation*. In this study, many teachers (volunteers) were unwilling to evaluate the search tool's options and features, for the second time (chapter 4; section 4.5).

Nevertheless, the limitations highlighted in this case study can be informative in addressing future research studies relating to this field.

8.4.1 Future work

In this thesis, the model describing teachers' online searching needs and their preferences could potentially be developed further by carrying out (a) multiple case studies, (b) refining and making the research instruments more sophisticated and (c) re-designing, developing and evaluating the revised search tool, for the third time round:

Firstly, findings would be richer if *multiple case studies* of different group of teachers can be carried out independently with the aid of the System Development

Life Cycle methodology, in order to further investigate about the kind of search options and features teachers need at different teaching levels that is primary, secondary and post-compulsory level.

Secondly, the research instruments could be *refined and made more sophisticated* in the third round of the iterative case study by including additional variables such as the 'taught national curriculum' (subject specification) of individual teachers and their preferred teaching style. The online resources usages of teachers could also be investigated within the context of the personalised search tool by using the research question "What extent does web personalisation enhances the online resources usages of teachers?" For example, by looking at the kind of online resources that teachers bookmark, download, modify and or print when searching online via the personalised search tool.
Another relevant issue that could also influence the web searching practices of individual teachers is learning about their disabilities in order to find ways to accommodate their web searching needs. Search tools/engines needs to design accessible search options and features (web pages) for teacher practitioners with disabilities and to accommodate their preferred way of interacting with the search tool.

In addition, researchers could study the online searching needs and search behaviour of teachers in their workplace or wherever they are actually searching online.

Finally, the revised search tool (research prototype) developed in this case study, could be *re-designed, developed and evaluated for the third time round*, using the System Development Life Cycle methodology, in order to measure the usefulness of teachers returned search results, within the context of a personalised search tool.

8.4.2 Recommendations to the government, teacher trainers and software designers

The work presented in this thesis, has provided a model of teachers information needs and preferences that can be used by the government, teacher trainers and search engine designers to gain an insight into the information needs and search behaviours of teachers when searching for online teaching materials. Hence, to make

online searching easier for teachers and to further tackle technical barriers faced by teachers when using the internet, the following recommendations are made to the government, teacher trainers and search engine designers:

- The researcher's recommendation to the *government* is to continue making a bank of relevant and or useful online teaching resources for teachers to search from, preferably with 'free' access. The government need to establish a way that allows teachers to search their bank of online resources via a generic search engines like Google or indeed any other front end search tools. In this thesis, results from the questionnaire survey (chapter 7, section 7.3) showed that Google is teachers preferred search engine and that specialised search engines are not in demand.

  In addition, online resources need to be monitored and evaluated by teacher practitioners on regular basis in order to increase teachers' chance of finding relevant and useful online resources. Individual teachers need to be able to ask for missing online resources by putting forward their order of content (validated by the relevant educational bodies) to the content designers and developers.

  > "If search engines can extract more meaning from text and better understand what people are looking for, the Web's resources could be accessed more effectively." (Savage, 2010, page 27)

- The researcher's recommendation to *teacher trainers* is to offer formal training courses in internet searching, at different educational levels. Teachers at primary, secondary and post-compulsory levels needs to be familiarised with search services personalised search options and features, this includes search engines advanced search options.

  This could be a one day training course covering topics like introduction to the World Wide Web and search engines development, discussion on the available generic, educational and meta-search engines followed by the presentation of available advanced search features in generic search engines like Google. For example, showing teachers that with the Google's 'Advanced Search', they can refine returned search results to web pages that contain their exact search keywords or phrase together with having the option to narrow down their search results to a particular language, region, file type, site or domain. In this formal

internet searching training, teachers need to be taught about possible ways of reporting their unsuccessful search results (missing online teaching resources) to appropriate educational and or governmental bodies, for their future use.

The aim of this training course should be to support individual teachers with their search query constructions (technical barriers), use of search options and features together with finding relevant and or useful online teaching resources. Hence, opening a channel of communication between the content designers and teachers to create and release appropriate online resources for their future web searching.

- The researcher's recommendation to *search engine and software designers* is to consider and indeed use the model of teachers' information needs and preferences that was described in this thesis in order to design personalised search engines/tools for teachers, in particular. The sixteen search options and features compiled in this case study should be enclosed in their search engine interface designs that are within the context of teachers' demographic information and experience.

  Search engine and software designers need to acknowledge the fact that the online information needs and search behaviours of teachers is indeed different from typical web users.

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Appendix VII

Results from paper questionnaires (1st iterative case study)

#	Contact	Gender	Level	Subject	Experience	Q 5	Q6	Q9	Q10	Q 11	Q12	Q13	Q14	Q15	Q16	Q17
*T1	Yes	Female	Primary	Generic	1 year	Yes	NA	Once a day	Sometimes	Text, Photos Graphics Audio: None Video: None	Google	Speed of access	The returned links are out of date No clear explanation of the search… Little or no information on what… No information on the required topic	No answer or option selected	Your student's age… The topic… The task ...	No answer
T2	No	Female	Primary	Other: (Early years)	1 year	Yes	NA	Once a day	Most of the time	Text Photos Audio: None Video: None	Google	Just out of habit	The search instructions are not clear	No answer	Your objective The topic… The task…	Add to a word ..
T3	Yes	Female	Primary	Modern foreign..	2 years	Yes	NA	Always	Most of the time	Text Photos Tables Diagrams Audio: None Video: None	Google	Jus t out of habit User friendly Speed of access	No option was selected/no response	Teachernet.gov.uk Because of "Great ideas, worksheets etc."	Your student's age… Your objective The topic… The task ….	Incorporate it… Add to word
T4	Yes	Female	Primary	Music	3 years	Yes	NA	Once a Day	Sometimes	Text Photos Graphics Diagram Audio: None Video (quick time)	Yahoo Google	I like the web…	No clear explanation of the search… Little or no information on what the… Other: "not specific enough" "relate to American sites – not relevant"	Free lesson Plans	Your student's age… Your objective The topic…	Incorporate it… Add to word
T5	Yes	Female	Primary	Generic	1 year	Yes	NA	Always	Sometimes	Text Photos Graphics Diagrams Audio: None Video (QT + real)	Google	Just out of habit	The returned links are out of date Little or no information on what the… No information on the required topic	Scholastic.com	Your student's age… Your objective The topic… The task ….	Incorporate it… Add to word Give it to your… Show it to your…
T6	No	Female	Primary	Generic	3 years	Yes	NA	Once a week	Sometimes	Text Photos Tables Diagrams Audio: MP3 Video: QT	Yahoo Google Ask Jeeves	Just out of habit	The returned links are out of date	No answer or option selected	Your student's age… Your objective The topic…	Incorporate it… Add to Power… Add to word
T7	Yes	Female	Primary	ICT	1 year	Yes	NA	Always	Sometimes	Text Images: All Audio: don't Video: don't	Google	Just out of habit	The returned links are out of date The search instructions are not clear Too much returned information	Educational resources Teacher resource Other: Hamilton Primary resources Because "-> for lesson plans. -> Games"	Your student's age… The topic…	Incorporate it… Add to word
T8	Yes	Female	Primary	Other: (Early years)	2 years	Yes	NA	Once a week	Most of the time	Text Photos Graphics Audio: don't Video: don't	Google MSN	Jus t out of habit User friendly	No clear explanation of the search… Too much returned information No information on the required topic	Educational resources Curriculum ideas Teacher resource Free lesson plans Theme pages… Sitesforteachers.com Other: enchanted learning	Your student's age… The topic… Other: "printable"	Give it to your… Other: "print and photocopy"
T9	No	Female	Primary	Generic	2 years	Yes	NA	Once a week	Sometimes	Text Photos Images-other "Worksheets" Audio: None Video: None	Google	Jus t out of habit	Too much returned information	None	Your student's age… Your objective The topic… The task …. The syllabus you…	Incorporate it… Give it to your… Show it to your…
T10	No	Female	Primary	Geography	3 years	Yes	NA	Once a week	Most of the time	Text Photos Graphics Diagrams Audio: None Video: None	Google	Speed of access	The returned links are out of date	Curriculum ideas Teacher resource	Your student's age… Your objective	Place it on your… Incorporate it… Add to word Give it to your… Show it to your…

#	Contact	Gender	Level	Subject	Experience	Q 5	Q6	Q9	Q10	Q 11	Q12	Q13	Q14	Q15	Q16	Q17
T11	Yes	Female	Secondary	Mathematics	1 year	Yes	NA	Occasionally	Most of the time	Text Tables Diagrams Audio: WM Video: no answer	Yahoo Google	Just out of habit User friendly	Too much returned information	Educational resources Teachernet.gov.uk	Your objective The topic…	Add to powerP… Add to word…
T12	Yes	Male	Secondary	Science	2 years	Yes	NA	Always	Most of the time	Text-Other: Information Photos Graphics Diagrams Audio: None Video: All	Google	Just out of habit	The returned links are out of date Too much returned information	None Why? " I have not found any of the free ones to be very imaginative or of much use"	Your student's age… Your objective The topic…	Incorporate it… Add to powerP… Add to word… Give it to your… Other: if video, refer directly to website
T13	Yes	Female	Secondary	Science	1 year	Yes	NA	Always	Most of the time	Text Photos Diagrams Audio: Real, WM Video: QT	Google	Just out of habit I like the web… Accuracy of data User friendly Speed of access	Too much returned information No information on the required topic	Free lesson plans Teachernet.gov.uk Why? "because I did not know about the other ones but now I do"	Your objective The topic… The task you are…	Incorporate it… Add to powerP… Add to word… Add to OHT
T14	Yes	Male	Secondary	History	4 years	Yes	NA	Always	Most of the time	Text Text-other: "Sources, jokes Images: Photos Graphics Diagrams Other: Maps, clipart Audio: None Video: None	Google	User friendly Size of repository Speed of access	The returned links are out of date Little or no information on what the…	Other: www.spasheus.com www.schoolshistory.co.uk	Your student's age… Your objective The topic… The syllabus you…	Incorporate it… Add to powerP… Give it to your…
T15	No	Male	Secondary	History	3 years	Yes	NA	Once a day	Sometimes	Text Images: All Audio: WM Video: QT	Yahoo Google Ask - Jeeves	Just out of habit	The returned links are out of date No clear explanation of the search… The search instructions are not clear Too much returned information	Teachernet.gov.uk "is the only one I was made aware of"	Your student's age… Your objective The topic… The syllabus you… The time allocated…	Incorporate it… Add to powerP… Add to word…
T16	Yes	Female	Secondary	Science	1 year	Yes	NA	Always	Sometimes	Text Photos Graphics Diagrams Audio: don't Video: MPEG, QT + Real	Google	Accuracy of data User friendly Size of repository	The returned links are out of date No information on the required topic "some things are too advanced for what I need"	Teacher resource Free lesson plans Bablefish Teacher.gov.uk "they come up during searches"	The topic… The task… The syllabus you…	Incorporate it… Add to powerP… Add to word…
T17	Yes	Female	Secondary	Social science	2 years	Yes	NA	Once a week	Sometimes	Text Graphics Tables Diagrams Audio: None Video: None	Google Ask - jeeves	Just out of habit Accuracy of data User friendly	Too much returned information	Free lesson plans "Did not know many of them existed"	The topic…	No answer
T18	Yes	Male	Secondary	Science	1 year	Yes	NA	Once a week	Most of the time	Text Photos Graphics Diagrams Audio: "none" Video: QT, MPEG, Real	Yahoo Google AOL MSN Ask - Jeeves	Just out of habit Size of repository	The returned links are out of date Too much returned information	None	Your student's age… Your objective The topic… The task… The time allocated…	Place it on your… Incorporate it… Add to powerP… Add to word… Add to OHT Give it to your…
T19	Yes	Female	Secondary	Music	2 years	Yes	NA	Once a week	Most of the time	Text Photos Graphics Audio: None Video: None	Yahoo Google	Just out of habit Accuracy of data User friendly	Too much returned information No information on the required topic	Educational resources Curriculum ideas Making a template on a PC	Your student's age… Your objective The topic… The task… The syllabus you… The time allocated…	Incorporate it… Add to word… Give it to your… Show it to your…

#	Contact	Gender	Level	Subject	Experience	Q 5	Q6	Q9	Q10	Q 11	Q12	Q13	Q14	Q15	Q16	Q17
T20	Yes	Female	Secondary	Music	4 years	Yes	NA	Once a week	Sometimes	Text – other: "Music scores/graphic scores" Photos Graphics Audio: WM Video: None	Yahoo Google AOL	Just out of habit	Too much returned information	No option/s were selected	Your student's age… Your objective The topic… The task… The syllabus you… The time allocated…	Incorporate it… Add to powerP… Give it to your… Add it to poster.. Show it to your…
T21	No	Male	Post-com	Not stated/selected	6 years	Yes	NA	Once a week	Sometimes	Text Photos Audio: None Video: QT	Yahoo Google	Just out of habit Accuracy of data User friendly	Little or no information on what the… Too slow	No option/s were selected	Your objective The topic…	Incorporate it… Add to word…
T22	Yes	Male	Post-com	Science	20 years	Yes	NA	Occasionally	Most of the time	Text Images: All Audio: none Video: none	Google	Just out of habit User friendly	Too much returned information	Free lesson plans Graphic organizer …	Your student's age… Your objective The topic… The task…	Place it on your…
T23	Yes	Male	Post-com	ICT	5 years	Yes	NA	Every three-month	Sometimes	Text Images: All Audio: none Video: none	Yahoo Google	Just out of habit Size of repository Speed of access	Too much returned information No information on the required topic "(1) search engines do not store many dynamically generated pages. (2) they cannot access password restricted pages e.g. from Journals"	None	The topic… The syllabus you…	Incorporate it… Add to powerP… Add to word… Add to OHT
T24	Yes	Female	Post-com	Social science (sociology)	5 years	Yes	NA	Occasionally	Most of the time	Text Tables Diagrams Audio: none Video: none	Google	User friendly Speed of access	The returned links are out of date Too much returned information Other: "Search made on individual words rather than a sentence."	None	The topic… The syllabus you…	Add to word… Give it to your…
T25	Yes	Male	Post-com	Social science (psychology)	3 years	Yes	NA	Occasionally	Sometimes	Text Photos Audio: none Video: none	Yahoo Google AOL MSN Netscape Ask-jeeve LookSmart InfoSpace Lycos	Speed of access	Little or no information on what the…	None	Your student's age… Your objective The topic… The task… The syllabus you…	Incorporate it… Give it to your…
T26	Yes	Female	Post-com	English	1 year	Yes	NA	Once a week	Most of the time	Text Images: All Audio: none Video: none	Yahoo Google Ask-Jeeves Dogpile Lycos	Just out of habit Accuracy of data	No clear explanation of the search… Too much returned information	Teachernet.gov.uk Other: Teachit.co.uk "Provides a number of useful and innovative resources created by English teachers. The resources are in Word and so are adaptable"	Your student's age… Your objective The topic… The task… The syllabus you…	Incorporate it… Give it to your…
T27	Yes	Male	Post-com	History	2 years	Yes	NA	Once a week	Most of the time	Text Images: All Audio: none Video: Real	Yahoo Google Ask-Jeeves	Just out of habit Size of repository Speed of access	The returned links are out of date Little or no information on what the…	Free lesson plans Other: activehistory.co.uk Schoolhistory.co.uk "Relevant resources for topics being taught. Can save time and provide some activities which are appropriate as starters"	Your objective The task…	Incorporate it… Add to powerP… Add to OHT Show it to your…
T28	Yes	Female	Post-com	Mathematics	3 years	Yes	NA	Occasionally	Most of the time	Graphics Audio: None Video: None	Google	Just out of habit	Little or no information on what the…	Curriculum ideas	Your student's age… Your objective The syllabus you…	Incorporate it… Give it to your…
T29	No	Female	Post-com	English with Drama	1 year	Yes	NA	Occasionally	Sometimes	Text Audio: None Video: None	Google	Just out of habit	No clear explanation of the search…	None	The topic…	Incorporate it… Add to word…

#	Contact	Gender	Level	Subject	Experience	Q 5	Q6	Q9	Q10	Q 11	Q12	Q13	Q14	Q15	Q16	Q17
T30	No	Male	Post-com	Art & Design	1 year	Yes	NA	Occasionally	Sometimes	Text-other: "Art" Graphics Audio: don't Video: don't	Google AllTheWeb	Accuracy of data	Too much returned information	Curriculum Ideas Learning wales.gov.uk	Your student's age… Your objective	Incorporate it…

#	Q 7	Q 8	Q 18
T1	"Easily accessed and printable. Saves time and effort."	"Finding relevant info can be hard. Always have to adapt material to suit the purpose."	"Provide lessons ideas relevant to the necessary topic."
T2	***The respondent refused to answer this question.***	"Hard to find good stuff."	"A search engine that is curriculum based so that results are narrowed and focused and relevant for the age phase"
T3	"Getting ideas from other teachers and sources for subject areas."	"Sometimes it is difficult to find primary school resources from the secondary school resources."	"Find the subject, year and relevant links to the national curriculum."
T4	"Finding things that you don't expect to find."	***The respondent refused to answer this question.***	"Be specific and show results for key stage, year group and maybe say if there's a lesson plan and worksheets attached."
T5	***The respondent refused to answer this question.***	***The respondent refused to answer this question.***	"Printable worksheets, learning interactions, lesson plans, cross-curricula links."
T6	***The respondent refused to answer this question.***	***The respondent refused to answer this question.***	"Find worksheets and interactive. Teaching tools e.g. PowerPoint displays or multimedia clips about my topic and for my age range (5-7yrs)."
T7	***The respondent refused to answer this question.***	"Ready made resources, ready made lesson plans."	"It would be nice to have a search engine which has lesson plans and relevant worksheets for each year group."
T8	***The respondent refused to answer this question.***	***The respondent refused to answer this question.***	"Relevant to age-phase (early years) printable and topic based with suggestions for differentiation and assessment."
T9	***The respondent refused to answer this question.***	***The respondent refused to answer this question.***	"Worksheet, pictures, lesson plans."
T10	***The respondent refused to answer this question.***	***The respondent refused to answer this question.***	"Find worksheets, interactive teaching tools, be able to store them, put a tap on it."
T11	***The respondent refused to answer this question.***	***The respondent refused to answer this question.***	"Search specific years topics and various types of differentiation to narrow down the searches."
T12	***The respondent refused to answer this question.***	***The respondent refused to answer this question.***	"Find moving graphic relevant to the subject researched."
T13	***The respondent refused to answer this question.***	"Often worksheets provided are inappropriate to my objectives."	"Give worksheets, diagrams, images objectives."
T14	"Part of my teaching preparation. i will look online via search engines or to established addresses; find information to devise own worksheets/PowerPoint presentations."	***The respondent refused to answer this question.***	"It records my profile: to present search results in what i am teaching and which KS. It remembers searchers I have made; It will 'volunteer' to save chosen sites into an organised storage".
T15	***The respondent refused to answer this question.***	***The respondent refused to answer this question.***	"Contain images, bibliographic, quires, ideas for starts and planning to coming together relevant information."
T16	***The respondent refused to answer this question.***	"Not detailed/too detailed, slightly wrong syllabus."	"Find things at the correct level. Find lots of different media including videos."
T17	***The respondent refused to answer this question.***	"Too many resources."	"Find information matching exactly what is put into search box to avoid lots of irrelevant information e.g. you can put in exact topic and level."
T18	"You can get a variety of pictures, simulations and other interactive media at no cost. "	"Many sites no longer exist. There are a huge number of un-useful sites, occasionally materials encourage bad science. Sometimes it is difficult to download applications."	"Filter sites without educational content. Search for resources by topic and type i.e. image, worksheet, simulation, movie clip, game. ICT activity, spreadsheet etc. Differentiate between free resources and those you have to pay for. Provide researchers sites for student projects."
T19	"Accessible, simple to do."	"Sometimes it can be too vague or can not find relevant materials or too much to look through."	"Find relevant info quickly and easily. Perhaps with links to relevant areas/songs. Easy to copy, paste, change."
T20	***The respondent refused to answer this question.***	***The respondent refused to answer this question.***	"Display examples of schemes of work-offer printable resources related to these."
T21	***The respondent refused to answer this question.***	***The respondent refused to answer this question.***	"Give imagery."
T22	"Ease of finding relevant info."	"Some times there is too much irrelevant info to be filtered in order to select the useful parts."	"Allow access to different levels of competency/difficulty of their key concept I need to introduce."
T23	***The respondent refused to answer this question.***	***The respondent refused to answer this question.***	"To be able to type in curriculum level and subject and it returns a set of resources for the teacher to use."
T24	"When I find materials that is relevant to my teaching."	"Often you find links that are expired!."	"To be specific to my subject; to be specific to my syllabus; to help specifically with teaching materials."
T25	"Speed, convenience."	"Sitting through useless information."	"Have up to date relevant hyperlinks. Clearly defined age groups"
T26	"Lots of materials from different sources, able to search quickly."	"Sometimes a number of things not relevant to your search come up."	"Focus on your specific syllabus and specification. Focus on age group you are teaching. Provide access to printable and adaptable resources."
T27	"Allow access to different levels of competency/difficulty of their key concept I need to introduce."	"There are too much irrelevant information on the web."	"I would like it to find appropriate material, especially images which can be deemed appropriate for each year group and ability. I would also like to be able to find resources on all possible topics that could be covered. This would also include the well-known areas and maybe few that are less known but still provide a useful tool to teach with."
T28	"Finding materials relevant to my teaching."	"Links that are expired!; Links that need to be registered for; links that require a registration free."	"Free, downloadable, doc, pdf, pp files to use as resources, well organised and navigable."
T29	"Easy access and saves time"	"Have to adapt material to relevant to my teaching."	"Have printable worksheets of all aspects of the curricula"
T30	"Ideas"	"Quality and writing"	"More refined search that is easy to use. Have printable worksheets of all aspects of the curriculum."

* Please note notation 'T1' stands for 'Teacher Number 1'

Question Number	The Questionnaire (Paper-based)
Part 1:	**About you**
1(a)	Name
1(b)	Email Address
1 (c)	If you do NOT wish for the researcher to contact you via email Please tick this box.
1 (d)	Gender
2	At what level do you teach?
3	Please choose your subject area
4	How much teaching experience do you have, including PCGE training? *(Please write your figure inside the dotted box)*
Part 2:	**About Online materials**
5	Do you look for teaching materials online?
6	If 'No', would you consider using online materials for your teaching?
7	What do you like most about searching online for your teaching materials?
8	When searching online for your teaching materials, what features or characteristics do you dislike?
Part 3:	**About searching for online materials**
9	How often do you search for teaching materials online?
10	When you search online on average how often do you find the materials you were looking for? *This question was selected from this website: http://www.ariadne.ac.uk/issue6/survey /*
11	What type of multimedia do you look for? *(you may tick more than one box)* *This question was selected from this website: http://www.ariadne.ac.uk/issue6/survey/* *The defined specification for images, audios and videos was obtained from the AltaVista Search engine (www.altavista.com)*
12	Which search engines do you use? *(you may tick more than one box)* This question was put together using the article titled "An investigation into World Wide Web Search Engine use from http://www.ariadne.ac.uk/issue6/survey
13	Why do you choose a search engine?
14	What problems do you encounter with existing search engines? *(you may tick more than one box)*
15	Which one of these Curriculum Resources do you use? *(you may tick more than one)* *This question was put together using the article tiled, "An investigation into World Wide Web Search Engine use from within the UK - preliminary findings", at http://www.ariadne.ac.uk/issue6/survey/*
16	What criteria do you consider to be very important when you search online for teaching materials? *(you may tick more than one box)*
17	What do you do when you have located/found your desired object? *(you may tick more than one box)*
Part 4:	**About your ideal search engine**
18	Imagine an ideal intelligent search engine, which finds objects relevant to what you are teaching. Please give example of what you would like it to do?

Appendix I

Paper questionnaire (piloting)

Part ---------- Question ----------

Part ---------- Question ----------

Questionnaire Code:

Dear Participants,

Thank you for agreeing to participate in this project that will contribute greatly to the completion of my dissertation. Please note that your participation in this research is entirely on voluntary basis and that you may stop at any point or choose not to answer any particular question.

The objective of this questionnaire is to investigate the requirements and to identify the features/characteristics needed to design an Adaptive Personalised Search Tool, which would enable teachers to search for materials such as text, pictures, videos, animation etc, in order to enhance his/her daily teaching. The difference between this adaptive search tool and other search systems is that:

a) It is designed specifically for teachers,
b) It is adaptive to the individual teachers' need and their objective thus, allowing the teacher to conduct a more efficient and effective search.

The findings from this survey would be the preliminary work for designing the architecture of such a system.
All information collected here will remain confidential and will not be personally identifiable. I, herby, guarantee that the data obtained from this questionnaire will be utilized only for academic purposes.

Please use the spare sheet at the end of this questionnaire in cases where you may need more space to complete your answer.

Yours Sincerely,

Faezeh Seyedarabi
f.seyedarabi@ioe.ac.uk
Research Officer
Institute of Education (iClass Project)
London Knowledge Lab
23-29 Emerald Street, Second Floor
London WC1N 3QL, UK
Tel: +44 20 7763 2167
http://www.londonknowledgelab.ac.uk/

Date / /200- **Time** : pm/am **Room Number**

There are 4 sections and 9 pages in this questionnaire.

Part 1A: About You

Code

Name: ---------- AA

Email Address: ---------- BB

☐ If you do NOT wish for the researcher to contact you via email Please tick this box. CC

1. Please identify your self by ticking the relevant statement. 1

☐ "I am a full time PGCE Student, final term at the Institute of Education (IoE)." 1A
Please continue to the next question

☐ "I am a PGCE Teacher at the Institute of Education (IoE)." 1B
Please go to Part1B

2. Please choose your PGCE Course Title. (Tick one box only) 2

☐ Primary PGCE (full time) 2A
☐ Secondary PGCE (full time) 2B
☐ Post-Compulsory PGCE (full time) 2C

3. Please choose your subject area. (Tick one box only) 3

☐ Art and Design 3A
☐ Business & Economics Education 3B
☐ Citizenship 3C
☐ English 3D
☐ English with Drama 3E
☐ Geography 3F
☐ History 3G

☐ Information & Communications Technology 3H
☐ Mathematics 3I
☐ Modern Foreign Languages 3J
☐ Music 3K
☐ Religious Edtucation 3L
☐ Science 3M
☐ Social Science with Humanities 3N
☐ Other 3O

4. How much teaching experience do you have, including PCGE training? (Please write the figure on the dotted line) 4

------ Hour 4A
------ Day 4B
------ Week 4C
------ Month 4D
------ Year 4E
☐ None 4F
Please go to Part 2

Part 1B: About You

5. How long have you been teaching PGCE Course/s? (In and away from IoE) 5

☐ Less then one year 5A
☐ 1-2 years 5B
☐ 3-4 years 5C
☐ 5-6 years 5D
☐ 7-8 years 5E
☐ 9-10 years 5F
☐ 11+ 5G

6. How long have you been teaching in general? (In and away from IoE) 6

☐ Less then one year 6A
☐ 1-2 years 6B
☐ 3-4 years 6C
☐ 5-6 years 6D
☐ 7-8 years 6E
☐ 9-10 years 6F
☐ 11+ 6G

Code

7. At what level do you teach PGCE? (You may tick more than one box) — 7

- ☐ Primary PGCE (full time) — 7A
- ☐ Secondary PGCE (full time) — 7B
- ☐ Post-Compulsory PGCE (full time) — 7C

8. What subject areas do you teach? (You may tick more than one box) — 8

- ☐ Art and Design — 8A
- ☐ Business & Economics Education — 8B
- ☐ Citizenship — 8C
- ☐ English — 8D
- ☐ English with Drama — 8E
- ☐ Geography — 8F
- ☐ History — 8G
- ☐ Information & Communications Technology — 8H
- ☐ Mathematics — 8I
- ☐ Modern Foreign Languages — 8J
- ☐ Music — 8K
- ☐ Religious Education — 8L
- ☐ Science — 8M
- ☐ Social Science with Humanities — 8N
- ☐ Other — 8O

Please go to Part 2

End of Part 1

Code

Part 2: About Online Materials

9. Do you look for teaching materials on line? (Please tick one box only) — 9

- ☐ No — 9A

If No, why not?

Please go to next question

- ☐ Yes — 9B

If Yes, why?

Please go to part 3

10. Would you consider using online materials with your teaching? — 10

- ☐ Yes — 10A
- ☐ No — 10B
- ☐ Maybe — 10C
- ☐ I Don't Know — 10D
- ☐ It Depends on ---------- — 10E

End of Part 2

Code

Part 3: About searching for online Materials

11. How often do you search for teaching materials online? — 11

- ☐ Always — 11A
- ☐ Once a Day — 11B
- ☐ Once a Week — 11C
- ☐ Once a Month — 11D
- ☐ Every Three-Month — 11E
- ☐ Once a Year — 11F
- ☐ Occasionally — 11G
- ☐ Never — 11H

12. What do you like most about searching online for your teaching materials? — 12

---

13. When searching online for your teaching materials, what features or characteristics do you dislike? — 13

Code

14. When you search online, on average how often do you find the object you were looking for? — 14

- ☐ Always — 14A
- ☐ Most of the time — 14B
- ☐ Sometimes — 14C
- ☐ Never — 14D
- ☐ Don't Know — 14E

15. When you search online for teaching materials what criteria do you consider to be the most important thing? (you may tick more than one box) — 15

- ☐ Your students' age group — 15A
- ☐ The topic you want to teach — 15B
- ☐ The task you are going to do i.e. poster design, handouts, class exercise — 15C
- ☐ The syllabus you are teaching — 15D
- ☐ The Time allocated/allowed for your teaching — 15E
- ☐ The syllabus you are teaching — 15F
- ☐ Other. Please specify — 15G

(1) ----------
(2) ----------
(3) ----------

16. What do you do when you have located/found your desired object? — 16

(you may tick more than one box)

- ☐ Add it to a PowerPoint presentation — 16A
- ☐ Add it to a word document — 16B
- ☐ Add to OHT (Over Head Transcript) slides — 16C
- ☐ Give it to your students as a handout — 16D

Code

☐ Add it to your poster presentation/wall poster/class poster — 16E
☐ Show it to your students — 16F
☐ Add it in the class/school Newsletter — 16G
☐ Other, Please specify — 16H
(1) ---------- 16I
(2) ---------- 16J
(3) ---------- 16K
☐ I Don't Know

17. What type of multimedia do you look for? (You may ticket more than one item) [1] — 17

Text — 17A
☐ Text

Images: — 17B
☐ Photos — 17C
☐ Graphics — 17D
☐ Tables — 17E
☐ Diagrams — 17F
☐ Other, Please specify ---------- — 17G
☐ Don't Know

MP3/Audio: — 17H
☐ MP3 — 17I
☐ WAV — 17J
☐ Real

[1] The defined specification for images, audios and videos was obtained from the AltaVista Search engine (www.altavista.com)

Code

☐ AIFF — 17K
☐ Windows Media — 17L
☐ Other, Please specify ---------- — 17M
☐ Don't Know — 17N

Video: — 17O
☐ MPEG — 17P
☐ AVI — 17Q
☐ QuickTime — 17R
☐ Real — 17S
☐ Other, Please specify ---------- — 17T
☐ Don't Know

End of Part 3

Code

Part 4: About your ideal search system/engine

18. What would be your ideal search? (Please tick one box only) — 18

☐ Would you like the search engine/system to find the object you are looking for and ensure that you can copy and paste it on to your document? — 18A

☐ Would you like the search engine/system to find the object and place it in the relevant format? For example, prepare a poster format/style and place the picture in the correct position or make a handout for you. — 18B

☐ None — 18C

☐ Other, Please specify — 18D

☐ Don't Know — 18E

Thank You for Your Valuable Time & Information

Part ---------- Question ----------

Part ---------- Question ----------

Appendix I

Feedback from the questionnaire expert

"I suggest that you shorten the 'Dear Participants' bit, that you make some changes to question 4 which I think is currently unclear, that you slightly change the layout for Q9. Section 3 seems to be only relevant to those who answer Yes to Q9 and this is not made clear. Not quite sure what you want form Q12 but suspect it could be made clearer. Q 15 - don't the word 'most' if they can pick more than one important thing. The font size seemed quite small to me. Maybe this is because my eyesight isn't great but I think you could make it font size 11 or 12", **Questionnaire expert at IoE, Email, Tue 18/01/2005 23:14**.

Appendix II

Paper questionnaire (1st iterative case study)

Questionnaire Code:

Dear Participants,

Thank you for agreeing to participate in this project that will contribute greatly to the completion of my dissertation. Please note that your participation in this research is entirely on a voluntary basis and that you may stop at any point or choose not to answer any particular question.

The objective of this questionnaire is to help design an Adaptive Personalised Search Tool, which would enable teachers to search for materials such as text, pictures, videos and animation to use in their daily teaching. The difference between this adaptive search tool and other search systems is that:

a) It is designed specifically for teachers,
b) It is adaptive to the need and objective of the individual teacher and allows the teacher to conduct a more efficient and effective search.

The findings from this survey would be the preliminary work for designing the architecture of such a system. All information collected here will remain confidential and will not be personally identifiable. The data obtained from this questionnaire will be utilized only for academic purposes.

Please use the spare sheet at the end of this questionnaire in cases where you may need more space to complete your answer.

Yours Sincerely,

Faezeh Seyedarabi
Research Officer (iClass Project)
F.Seyedarabi@ioe.ac.uk
www.lkl.ac.uk

Code

There are 4 sections and 14 pages in this questionnaire.

Part 1: About You

Name: ----------

Email Address: ----------

☐ If you do NOT wish for the researcher to contact you via email Please tick this box.

1. Please identify yourself by ticking the relevant statement. **Q1**

☐ "I work as a qualified teacher." **1**

Please continue to the next question

If your answer is 'No' please stop here. Thank you.

2. At what level do you teach? *(tick one box only)* **Q2**

☐ Primary **1**

☐ Secondary **2**

☐ Post-Compulsory **3**

3. Please choose your subject area. *(tick one box only)* **Q3**

☐ Art and Design **1**

☐ Business & Economics Education **2**

☐ Citizenship **3**

☐ English **4**

☐ English with Drama **5**

☐ Geography **6**

Code

- ☐ History — 7
- ☐ Information & Communications Technology — 8
- ☐ Mathematics — 9
- ☐ Modern Foreign Languages — 10
- ☐ Music — 11
- ☐ Religious Education — 12
- ☐ Science — 13
- ☐ Social Science with Humanities — 14
- ☐ Generic — 15
- ☐ Other, Please specify ---------- — 16

4. How much teaching experience do you have, including PCGE training? *(Please write your figure inside the dotted box)* — Q4

☐ — 1

Please go to Part 2

End of Part 1

Code

Part 2: About Online Materials

Q5

5. Do you look for teaching materials online? *(tick one box only)*

☐ Yes……*Please go to Part 3.* 1

☐ No……*Please go to the next question.* 2

Please give the reason for your chosen answer

Q6

6. Would you consider using online materials for your teaching?

☐ Yes 1

☐ No 2

☐ Maybe 3

☐ It Depends on 4

☐ I Don't Know 5

Please go to part 4

Code

Q7

7. What do you like most about searching online for your teaching materials?

Q8

8. When searching online for your teaching materials, what features or characteristics do you dislike?

End of Part 2

Code

Part 3: About searching for online Materials

Q9

9. How often do you search for teaching materials online?

- ☐ Always — 1
- ☐ Once a Day — 2
- ☐ Once a Week — 3
- ☐ Once a Month — 4
- ☐ Every Three-Month — 5
- ☐ Occasionally — 6
- ☐ Never — 7

Q10

10. When you search online on average how often do you find the materials you were looking for?

- ☐ Always — 1
- ☐ Most of the time — 2
- ☐ Sometimes — 3
- ☐ Never/Rarely — 4
- ☐ Don't Know — 5

Q11

11. What type of multimedia do you look for? *(you may tick more than one box)* [1]

Text

- ☐ Text — 1
- ☐ Other, Please specify ---------- — 2

Images:

- ☐ Photos — 1
- ☐ Graphics — 2

[1] The defined specification for images, audios and videos was obtained from the AltaVista Search engine (www.altavista.com)

	Code
☐ Tables	3
☐ Diagrams	4
☐ All	5
☐ Other, Please specify ----------	6
☐ Don't Know	7
MP3/Audio:	
☐ MP3	1
☐ WAV	2
☐ Real	3
☐ AIFF	4
☐ Windows Media	5
☐ All	6
☐ Other, Please specify ----------	7
☐ Don't Know	8
Video:	
☐ MPEG	1
☐ AVI	2
☐ QuickTime	3
☐ Real	4
☐ All	5
☐ Other, Please specify ----------	6
☐ Don't Know	7

Code

Q12

12. Which search engines do you use? (you may tick more than one box)[2]

- ☐ Yahoo — 1
- ☐ Google — 2
- ☐ Google Scholar — 3
- ☐ AOL — 4
- ☐ MSN — 5
- ☐ Netscape — 6
- ☐ Ask Jeeves — 7
- ☐ AltaVista — 8
- ☐ AllTheWeb — 9
- ☐ Teoma — 10
- ☐ Gigablast — 11
- ☐ LookSmart — 12
- ☐ InfoSpace — 13
- ☐ Open Directory — 14
- ☐ Dogpile — 15
- ☐ Lycos — 16
- ☐ Webcrawler — 17
- ☐ Infoseek — 18
- ☐ HotBot — 19
- ☐ Excite — 20
- ☐ DejaNews — 21
- ☐ Point — 22
- ☐ i-Explorer — 23
- ☐ World Wide Worm — 24
- ☐ Other, Please specify

(1) ---------- — 25

(2) ---------- — 26

(3) ---------- — 27

[2] This question was put together using "An investigation into World Wide Web Search Engine use from within the UK - preliminary findings" article , http://www.ariadne.ac.uk/issue6/survey/

Code

13. Why do you choose a search engine?[3] *(you may tick more than one box)*

Q13

- ☐ Just out of habit — 1
- ☐ I like the web page icons — 2
- ☐ Accuracy of data — 3
- ☐ User friendly — 4
- ☐ Size of repository — 5
- ☐ Speed of access — 6
- ☐ Other, Please specify — 7

(1) ---------- 8

(2) ---------- 9

(3) ----------

Q14

14. What problems do you encounter with existing search engines? [4]
(you may tick more than one box)

- ☐ The returned links are out of date — 1
- ☐ No clear explanation of the search results — 2
- ☐ The search instructions are not clear — 3
- ☐ Little or no information on what the links are — 4
- ☐ Too much returned information — 5
- ☐ No information on the required topic — 6
- ☐ Too slow — 7
- ☐ Other, Please specify — 8

(1) ---------- 9

(2) ----------

(3) ---------- 10

[3] Question 10 and 11 was selected from this website: http://www.ariadne.ac.uk/issue6/survey/

Code	
Q15	
1	☐ Ask ERIC
2	☐ SCORE
3	☐ Graphic Organizers (Adobe Acrobat printable pages!)
4	☐ Blue Web'n
5	☐ Kathy Schrock Home Page
6	☐ Tech Trekers.com
7	☐ Edhelper.com
8	☐ Franklin Institute Hot List by Subjects AllTheWeb
9	☐ Awesome Library
10	☐ Bigchalk.com (data base for lesson plans)
11	☐ Educational Resources
12	☐ Curriculum Ideas
13	☐ Curriculum Integration
14	☐ Teacher Resource
15	☐ Free Lesson Plans, Web Quests, Worksheets and Teacher Tools!
16	☐ Scholastic.com
17	☐ Houghton Mifflin
18	☐ Apple Learning Interchange
19	☐ Atomic Learning
20	☐ Becoming Human
21	☐ Theme Pages for Elementary Students and Teachers
22	☐ Sitesforteachers.com
23	☐ TeachersFirst.com
24	☐ The Teacher's Internet Use Guide designing lessons
25	☐ Bablefish (translates text from one language to another!)
26	☐ Graphic Organizer downloads
27	☐ EverythingESL.net

15. Which one of these Curriculum Resources do you use?[5] *(you may tick more than one)*

[5] This question was selected from the "Resources for Educational Change, and Technology Integration in the Curriculum" website, http://userwww.sfsu.edu/~peggyb/TL_hotlist.html#CurResourcesTeachers

Code

- ☐ Making a Template on a Mac — 28
- ☐ Making a Template on a PC — 29
- ☐ Visual Manipulative — 30
- ☐ Teachernet.gov.uk[6] — 31
- ☐ Learning wales.gov.uk — 32
- ☐ Assemblies — 33
- ☐ Other, Please specify — 34

(1) ---------- 35

(2) ---------- 36

(3) ---------- 37

☐ None

Why?

---

16. What criteria do you consider to be very important when you search online for teaching materials? *(you may tick more than one box)* — Q16

- ☐ Your students' age group/level — 1
- ☐ Your objective — 2
- ☐ The topic you want to teach — 3
- ☐ The task you are going to do i.e. poster design, handouts, class exercise — 4
- ☐ The syllabus you are teaching — 5
- ☐ The Time allocated/allowed for your teaching — 6
- ☐ Other, Please specify — 7

(1) ----------

(2) ---------- 8

[6] Option 32-34 was added to this question based on Ms Pam Robertson interview via e-mail.

Code

Q17

17. What do you do when you have located/found your desired object? (you may tick more than one box)

☐ Place it on your resource site (upload it to your website)	1
☐ Incorporate it in to your own materials.	2
☐ Add it to a PowerPoint presentation	3
☐ Add it to a word document	4
☐ Add to OHT (Over Head Transparency) slides	5
☐ Give it to your students as a handout	6
☐ Add it to your poster presentation/wall poster/class poster	7
☐ Show it to your students	8
☐ Add it in the class/school Newsletter	9
☐ Other, Please specify	10
(1) ----------	11
(2) ----------	12
(3) ----------	13
☐ Don't Know	

Q18

18. Do you like the search engine to recommend 'Cross Curricula' materials based on your selected keyword?

☐ Yes	1
☐ No	2
☐ Other, Please specify ----------	3
☐ Don't know	4

Code

Q19

19. How important is it for you to find online materials that satisfy ‘Cross Curricular’?

- ☐ Very important — 1
- ☐ Not important — 2
- ☐ It Depends on ---------- — 3
- ☐ Other, Please specify ---------- — 4
- ☐ Don’t know — 5

Q20

20. In your opinion which one of these categories would you like to use to differentiate your students when searching for your teaching materials?

- ☐ Gifted — 1
- ☐ Main scale — 2
- ☐ Special Educational Needs (SEN) — 3
- ☐ English as Additional Language (EAL) — 4
- ☐ All — 5
- ☐ Other, Please specify ---------- — 6
- ☐ Don’t know — 7

Please give the reason for your chosen answer

Code

Q21

21. How important is it for you to have printable worksheets with your online resource?

1 ☐ Very important

2 ☐ Not important

3 ☐ It Depends on ----------

4 ☐ Other, Please specify ----------

5 ☐ Don't know

Please give the reason for your chosen answer

Q22

22. How important is it for you to have project-based worksheets with your online resource?

1 ☐ Very important

2 ☐ Not important

3 ☐ It Depends on ----------

4 ☐ Other, Please specify ----------

5 ☐ Don't know

Please give the reason for your chosen answer

End of Part 3

Code

Part 4: About your ideal search system/engine

Q23

23. Imagine an ideal intelligent search engine, which finds objects relevant to what you are teaching. Please give example of what you would like it to do?

Q24

24. What would be your ideal search? *(Please tick one box only)*

1 ☐ Would you like the search engine/system to find the object you are looking for and ensure that you can copy and paste it on to your document?

2 ☐ Would you like the search engine/system to find the object and place it in the relevant format? For example, prepare a poster format/style and place the picture in the correct position or make a handout for you.

3 ☐ Both

4 ☐ Other, Please specify

---

5 ☐ Don't Know

Thank You for Your Valuable Time & Information

Part ---------- **Question ----------**

Part ---------- **Question ----------**

Appendix III

The online questionnaire forms

Questions marked with a * are required

100%

1.
Name *

Email Address

At which country do you teach? *

School/College Name *

How much teaching experience do you have, including PCGE (teacher training)? i.e. 3 years and 5 months

2. If you do NOT wish for the researcher to contact you via email please tick 'Yes'.
Yes

3. Please identify yourself by ticking the relevant statement. *
"I work as a qualified teacher."
"I am training to be a teacher."
"I am a private teacher."
"I am a retired teacher."
Other

4. At what level do you teach? *
Primary
Secondary
Post-Compulsory
Other

5. Please select your subject area *

6. Do you look for online resources/teaching materials? *

7. If No, would you consider using online materials for your teaching?

8. What do you like most about searching online for your teaching materials? *

9. When searching online for your teaching materials, what features or characteristics do you dislike? *

What did you search for? Please type in your query below i.e. Lesson plan for year 8 *

10. Which search option did you select? *
Cross Curricula
Differentiation
Project-based
VAK Plus

11. How many results did you get? i.e. 243,000,000 *

12. Please copy and paste the URL below *

13. Did you find what you were looking for? *
Yes

No

14. If No, what did you do next?

15. Please type in the same query in question 8 using Google search engine only; How many results did you get? i.e. 243,000,000 *

16. Please copy and paste the new URL below *

17. Did you find what you were looking for using Google search engine? *
Yes
No

18. If No, what did you do next?

19. Did you like the Search Tool (PoSTech)? *
Yes
No

20. Did you like the interface design? *

21. What did you like most about PoSTech? *

What problems/faults did you find when using PoSTech? *

22. What other functionalities would you like to add to the menu? *

23. I would prefer to ..... *
Learn Google language instead of using PoSTech
Use PoSTech (Personalised Search Tool For Teachers) Only
Both

24. What would be your ideal search? (wish list)

Appendix III

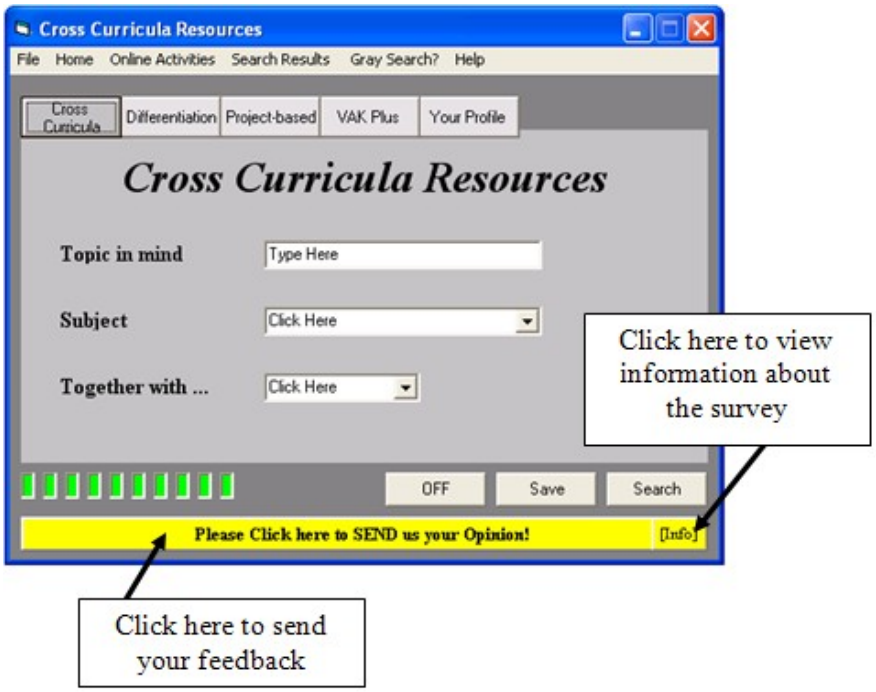
The seven new questions used for designing the online questionnaire.

New questions added	Answers Type
What did you search for? Please type in your query below i.e. Lesson plan for year 8	Large text area, unlimited answer size
Which search option did you select?	- Cross Curricula - Differentiation - Project-based - VAK Plus *For more explanation about these headings see chapter 5.*
Did you like the Search Tool (PoSTech)?	-Yes -No
Did you like the interface design?	-Yes -No
What did you like most about the search tool (PoSTech)?	Large text area, unlimited answer size
What problems/faults did you find when using the search tool (PoSTech)?	Large text area, unlimited answer size
What other functionalities would you like to add to the menu?	Large text area, unlimited answer size

The seven new questions included in the online questionnaire for 'Teachers' evaluation of the search tool' (phase 1 of the first round of the case study).

Appendix III

Teachers' access to the online questionnaire via the first search tool



Screenshot 5 Link to case study's cover letter and the online questionnaire.

Appendix IV

Paper questionnaire (2nd iterative case study)

Questionnaire Code:

Dear Teacher,

Thank you for agreeing to participate in this study. My name is Faezeh Seyedarabi (Email address: seyedara@aol.com) and your participation will contribute greatly to the completion of my dissertation at the Institute of Education (IoE). Moreover, the search tool used in this study was in connection with a four year European project called the iClass Project at the London Knowledge Lab (IoE).

The objective of this study is to investigate about individual teachers' online searching practices and needs in the UK, looking at teacher practitioners at primary, secondary or post-compulsory level.
Throughout this study I will be asking you questions, observing and talking to you about your background, online searching experiences, preferences and whether you would be willing to participate in related future studies. This study is expected to take an approximately 25-30 minutes.

In this study I would like you to perform the following tasks:

- **Task 1** – perform a *single* query using the designed artefact/tool called 'PoSTech' (Personalised Search Tool for Teachers); look for something that you are going to use for your next teaching or lesson.
- **Task 2** – I would then like you to perform the same query using all the available search options (features) in PoSTech.

Search Time: a single search will end when a teacher finds a useful resource or when the search is abandon (teacher gives up).

Throughout this study I will be using a software called '*My Screen Recorder v2.65*' in order to record our conversation and to capture your screenshots activities (i.e. search queries/keywords typed, search results, etc.).

Your name, school and contact details will remain anonymous and will not be referred to when reporting findings from this study. Thus, all information collected

here will remain confidential and will not be personally identifiable. The data obtained from this study will be utilized only for academic purposes.

Picture is taken from the iClass website at www.iclass.info

Your participation in this research is entirely on a voluntary basis and that you may stop at any point or choose not to do or answer any particular task/question. Moreover, as a token of my appreciation I will donate £1 to the SOS Children's Villages (charity number 1069207) for your contribution to this study.

Do you have any questions and/concerns before we start this interview?

Thank you,
Faezeh.

Name: _____

I am willing to participate in the research project outlined above. Thus, I am happy to be observed by Faezeh Seyedarabi and for my questionnaire and interview data as well as my search log to be used and published as part of this research.

☐ *I Agree*

Signature: _____ Date: - - / - - / 2008

Teacher Questionnaire

1a. Name

1b. Gender

Male	Female

1c. Age

20-24	25-29	30-34	35-49	50-54	55-59	60+

2. At what level do you teach?

Primary
Secondary
Post-compulsory

3. Please select your subject area

Art and Design Business & Economics Education Citizenship English English with Drama Geography	History ICT Mathematics Modern Foreign Languages Music Religious Education	Science Social Sciences with Humanities Generic Other ---------- ----------

4. How much teaching experience do you have including PCGE (teacher training)? i.e. 3 years and 5 months

5. Do you look for online resources/teaching materials?

Yes
No

6. If No, would you consider using online materials for your teaching?

Yes
No

7. Which search engines do you use/have experience of using? (you may fill more than one circle)

Yahoo
Google
Google Scholar
AOL
MSN
Ask Jeeves
MSN
AltaVista
Other .....

8. How often do you search for teaching materials online?

Always
Once a Day
Once a Week
Once a Month
Every Three-Month
Occasionally
Never

9. When you search online on average how often do you find the materials you were looking for?

Always
Most of the time
Sometimes
Never/Rarely
Don't Know

10. What do you like most about searching online for your teaching materials? *(you may select more than one)*

"Speed of information and variety of information"
"The variety of resources available"
"Finding things I didn't originally set out to"
"Instant Success!"
"It makes it possible to find a topic explained in various ways"
All of the above
Other .....

11. When searching online for your teaching materials, what features or characteristics do you dislike? *(you may fill more than circle)*

"Wasted time in fruitless searches"
"Too many results and becoming distracted"
"Materials that are not clearly linked to the national curriculum"
"Cluttered Images"
Other .....

12. Think about the following two statements and choose your answer accordingly[1].

(a) "I have a **lot** of experience in using the **Web**"

Strongly agree
Mostly agree
Neither agree nor disagree
Strongly disagree
Mostly disagree

(b) "I have a **lot** of experience in using **search engines**"

Strongly agree
Mostly agree
Neither agree nor disagree
Strongly disagree
Mostly disagree

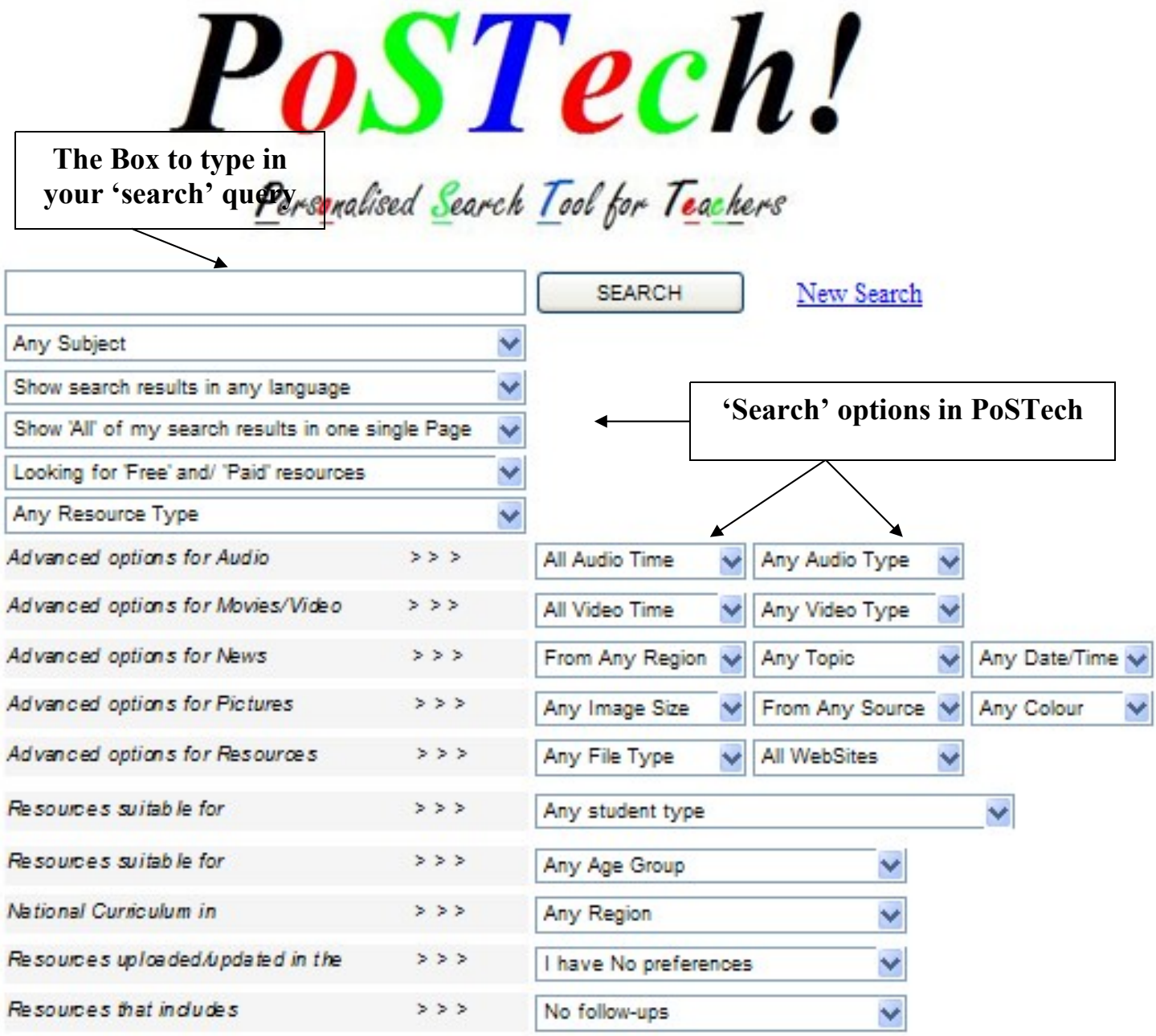
Thank you for your support and valuable time. The information collected here will be used to learn about the individual teachers' background, online searching practices and needs. Would you like the researcher to inform you about findings from this research study? Yes | No

If yes, could I please have your email address _____

[1] This question was adopted from Madden, Eaglestone, Ford and Whittle's study (unpublished), titled as the 'Ground truthing of transaction logs: verification of observations derived from search engine transaction logs'.

Appendix V

Introducing the revised search tool to teachers before their observation (2nd iterative case study)

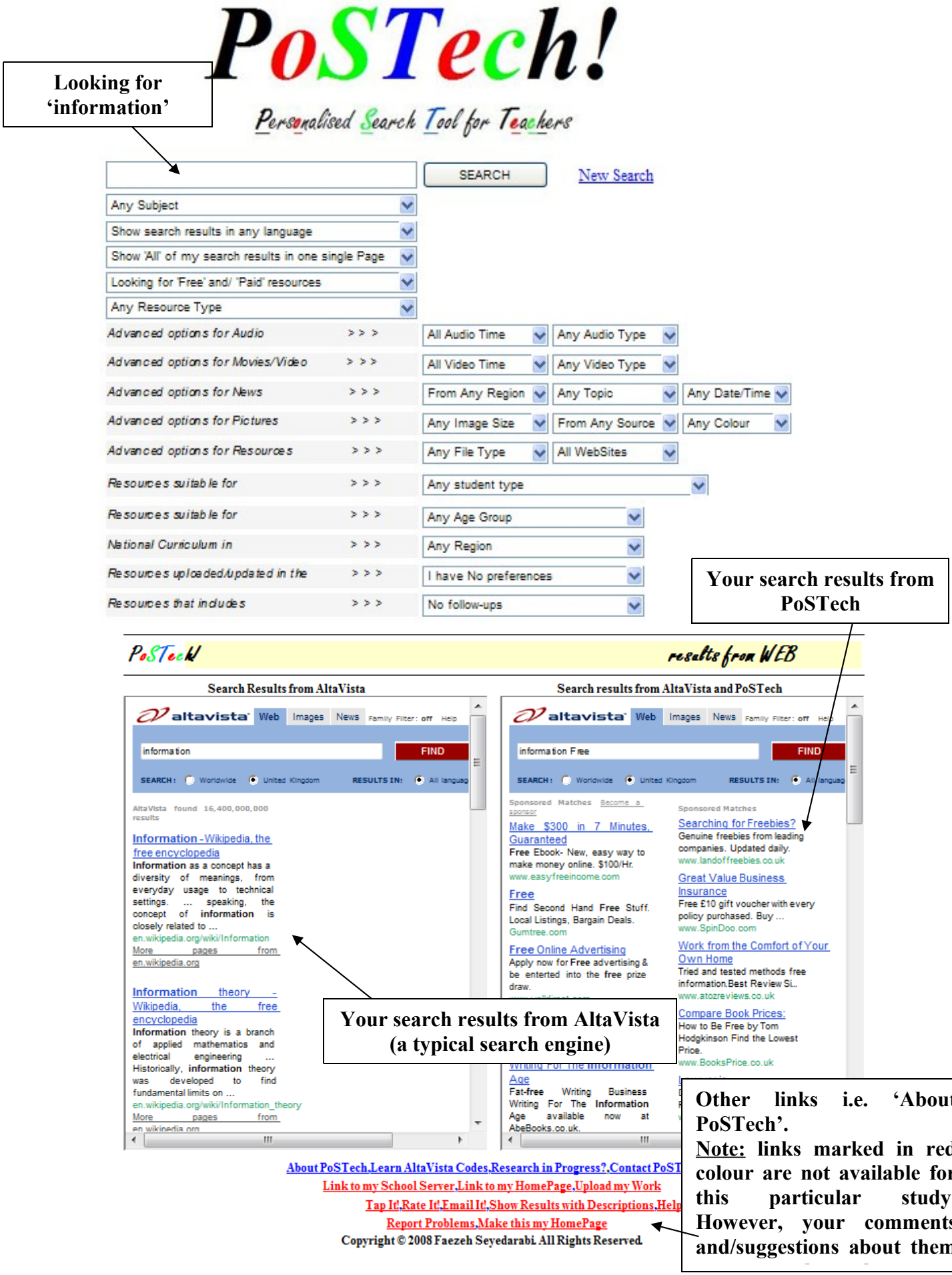


About PoSTech,Learn AltaVista Codes,Research in Progress?,Contact PoSTech

Link to my School Server,Link to my HomePage,Upload my Work

Tap It!,Rate It!,Email It!,Show Results with Descriptions,Help

Report Problems,Make this my HomePage


PoSTech!
Personalised Search Tool for Teachers
Looking for 'information'
SEARCH
New Search
Any Subject
Show search results in any language
Show 'All' of my search results in one single Page
Looking for 'Free' and/ 'Paid' resources
Any Resource Type
Advanced options for Audio
All Audio Time
Any Audio Type
Advanced options for Movies/Video
All Video Time
Any Video Type
Advanced options for News
From Any Region
Any Topic
Any Date/Time
Advanced options for Pictures
Any Image Size
From Any Source
Any Colour
Advanced options for Resources
Any File Type
All WebSites
Resources suitable for
Any student type
Resources suitable for
Any Age Group
National Curriculum in
Any Region
Resources uploaded/updated in the
I have No preferences
Resources that includes
No follow-ups
Your search results from PoSTech
PoSTech! results from WEB
Search Results from AltaVista
Search results from AltaVista and PoSTech
Your search results from AltaVista (a typical search engine)
About PoSTech,Learn AltaVista Codes,Research in Progress?,Contact PoST
Link to my School Server,Link to my HomePage,Upload my Work
Tap It!,Rate It!,Email It!,Show Results with Descriptions,Help
Report Problems,Make this my HomePage
Copyright © 2008 Faezeh Seyedarabi. All Rights Reserved
Other links i.e. 'About PoSTech'.
Note: links marked in red colour are not available for this particular study. However, your comments and/suggestions about them

Appendix VI

Interview guide (2nd iterative case study)

Below are questions repeated (reused) with slight modification in their wording from the online questionnaire that was originally used phase 4 of the 1st iterative case study together with their relevant probes.

Re-used questions from table 3	Probes
What did you like most about the revised search tool (PoSTech)?	- 'Interface design' - 'Speed' - 'Selecting/understanding different search criteria'
What problems/faults did you find when using the revised search tool (PoSTech)?	- 'Interface design' - 'Speed' - 'Selecting/understanding different search criteria'
What do you intent to do with your search results?	- Place it on your resource site (upload it to your website) - Incorporate it in to your own materials. - Add it to a PowerPoint presentation. - Add it to a word document - Add to OHT (Over Head Transparency) slides - Give it to your students as a handout - Add it to your poster presentation/wall poster/class poster - Show it to your students - Add it in the class/school Newsletter

Below are new questions added with their probes.

New questions added	Probes
"How do you think that this (search) went?"	➢ No probe was set
"How did you find the revised (PoSTech) search tool?"	➢ ➢ -
"Did the search tool fulfil your needs?"	- Your curriculum; The syllabus you are teaching - Your students' educational needs - Your personal preferences - Your students' age group/level - Your objective - The topic you want to teach - The Time allocated/allowed for your teaching - The task you are going to do i.e. poster design, handouts, class exercise
"In your opinion, if you were to use this search tool as part of your daily teaching practice what would get in the way of using it?"	No probes was set

"Would this search tool help you to do your job any differently?"	-
"Have you had any formal training in internet searching?"	
"Under what condition/s will you be willing to recommend this tool to your colleagues?"	-

Appendix VII

Results from online questionnaires (1st iterative case study)

#	Contact	Gender	Level	Subject	Experience	Q 5	Q6	Q7	Q8	Q9	Q11	Q12	Q13	Q15	Q16	Q17	Q18	Q19	Q22
*T1	No	Female	Primary	Mathematics	3 years	Yes	N/A	Number	VAK Plus	58,100	No	Tried Google	46,000	No its reports, forums etc	Nothing	No	No	Nothing	Learn Google…
T2	No	Female	Primary	Mathematics	7 years	Yes	N/A	Multiplication	Differentiation	0	No	Gave up	113,000	No, found one very useful link but was dead (page was not found) while others were syllabus/timetable, reports and programs	Gave up	No	No	Nothing	Learn Google…
T3	Yes	Female	Primary	English	8 years	Yes	N/A	Aztecs	Cross-curricula	0	No	Left site	75000	Yes	N/A	No	No	brightly coloured	Learn Google…
T4	No	Female	Primary	**English**	36 years	**Yes**	N/A	I wanted access to film clips for teaching narrative in English	Project-based	92	No	Gave up	1,450,000	Yes	N/A	No	No	Nothing	Learn Google…
T5	No	Male	Secondary	History	13 years	Yes	N/A	Ancient Greece	Cross-curricula	0	No	Gave up	34000	Yes	N/A	Yes	Yes	Easy interface	Learn Google…
T6	No	Female	Secondary	**Science**	25 years	**Yes**	N/A	Diagram or image showing the arrangement of muscles and tendons in a dissected chicken wing	VAK Plus	0	No	Tried a VAK search subject: science topic in mind: chicken leg dissection type: diagrams format: all	2	Yes	N/A	No	No	Potentially easy to use if the 4 headings were anything to do with my normal search criteria.	Learn Google…
T7	No	Male	Secondary	Music	3 years	Yes	N/A	pond life type	Project-based	36,600	No	changed to together with = "food chains in a pond" which gave 125 sites - not useful though http://www.google.co.uk/search?q="Science+Project""food%20chains%20in%20a%20pond"+Key%20Stage%203+free%20+%20free%20+%20free&hl=en&as_qdr=all&num=10	432	Yes	N/A	No	No	it was not helpful compared to google	Learn Google…
T8	No	Female	Secondary	**Science**	3 years	**Yes**	N/A	unbalanced forces for gifted children with worksheet	VAK Plus	0	No	try google	9210	Yes	N/A	No	Yes	easy to use	Learn Google…
T9	No	Male	Secondary	Mathematics	2 years	Yes	N/A	Equations	VAK Plus	172,000	No mainly books, programs	Nothing	27,500,000	Yes found 2 useful links on the first page	N/A	No	No	Not sure what it was trying to achieve	Learn Google…

											and research papers							
#	**Contact**	**Gender**	**Level**	**Subject**	**Experience**	**Q 5**	**Q6**	**Q7**	**Q8**	**Q9**	**Q11**	**Q12**	**Q13**	**Q15**	**Q16**	**Q17**	**Q18**	**Q19**	**Q22**
T10	Yes	Male	Secondary	Art and Design	2 years	Yes	N/A	GCSE Performing Arts	VAK Plus	15,800,000	No	Nothing	6,490	Yes	N/A	Yes	Yes	The potential to look for teaching material	Both
T11	No	Male	Post-comp	Information & Communications Technology	5 years	Yes	N/A	ICT	VAK Plus	49,800	No	Tried google	384,000	Yes	N/A	Yes	No	Sorting facilities A link to other schools who have used the system so teachers can communicate with each other and discuss issues relating to students.	Both
T12	No	Female	Post-comp	Art and Design	1 year	Yes	N/A	art and geometry	VAK Plus	0	No	Nothing	0	No	"nothing"	Yes	Yes	quick and easy	Learn Google…
T13	Yes	Male	Post-comp	ICT	2 years	Yes	N/A	binary search animation	VAK Plus	2	No	tried it in google on my own	45,700	No	"gave up after trying many pages"	No	Yes	the ability to filter out unwanted results. but google did show better results, ie there were some animations but very poor ones. posteach showed no animations in the results	Learn Google…
T14	Yes	Female	Post-comp	**Science**	2 years	**Yes**	N/A	i searched for some animations to simplify the theory of relativity	VAK Plus	1	No	i searched directly from Google	966000	Yes	N/A	Yes	Yes	the fact that it is personalised to me as it recognises me when I sign in	Both
T15	No	Male	Post-comp	Religious Education	3 years	**Yes**	N/A	Ben Meyer	VAK Plus	0	No	nothing	2,780,000	Yes 2 from the 1st page was useful	N/A	No	No	I didn't like anything about it	Learn Google…

* Please note notation 'T1' stands for 'Teacher Number 1'

#	Q10	Q14	Q20	Q21
T1	http://www.google.co.uk/search?as_*q="number"+"Mathematics"+Key%20Stage%201+free%20+%20free%20+%20free&as_filetype=&hl=en&as_qdr=w&num=30&imgsz=&imgc=*	http://www.google.co.uk/search?*q=number+ICT+activities+&as_qdr=w&meta=*	Too cluttered and therefore not user friendly for me	Voice recognition
T2	http://www.google.co.uk/search?*q="multiplication+Gifted+Mathematics"+Key%20Stage%202&hl=en&as_qdr=all&num=10*	http://www.google.co.uk/search?*q=multiplication+Gifted+Mathematics&meta=*	The meaning of 'time' entries in the drop down menus is not clear.	Something that find National Curriculum linked resources quickly.
T3	http://www.google.co.uk/search?*q="Aztecs+Cross%20Curricula+History"+WorkSheet+Key%20Stage%202+free%20+%20free%20+%20free&hl=en&as_qdr=all&num=%205&meta=cr%3DcountryUK%7CcountryGB*	http://www.google.co.uk/search?*q=aztecs+worksheets&btnG=Google+Search&meta=*	did not find information i was looking for	Access to images
T4	http://www.google.co.uk/search?*q="English+Project"+Key%20Stage%201+free%20+%20free%20+%20free&hl=en&as_qdr=all&num=10&as_sitesearch=edu*	http://www.google.co.uk/search?*q=film+clips+%2B+teaching+narrative&btnG=Google+Search&meta=*	Inflexible	key words
T5	http://www.google.co.uk/search?*q="ancient%20greece+Cross%20Curricula+History"+WorkSheet+Key%20Stage%202+free%20+%20free%20+%20free&hl=en&as_qdr=all&num=%205&as_sitesearch=edu*	http://www.google.co.uk/search?*q=ancient+greece+worksheets&btnG=Google+Search&meta=*	It put too many terms into Google, so no results were found	None, need to reduce options
T6	http://www.google.co.uk/search?*q="chicken%20leg%20dissection+Project"+Key%20Stage%203+free%20+%20free%20+%20free&hl=en&as_qdr=all&num=25*	http://www.google.co.uk/search?q=*%22chicken+leg+dissection%22+%2Bdiagram&btnG=Search&meta=*	The headings VAK project etc are not the sort of thing I would use as search terms. I always look for specific information or diagrams. If i would look on the type of website that provides the sort of teaching resource I like e.g. www.upd8.com.	I did not find it much help
T7	*http://www.google.co.uk/search?q="Science+Project"Pond%20life+Key%20Stage%203+free%20+%20free%20+%20free&hl=en&as_qdr=all&num=10*	http://www.google.co.uk/search?*q=%22food+chains+in+a+pond%22&btnG=Search&meta=* *3from the 1st page useful*	maybe looking for sites for a specific year group stopped it finding useful sites about food chains in a pond	the 4 headings are only good for looking for complete lesson plans but these are not very common
T8	http://www.google.co.uk/search?q=*"unbalanced%20forces+Gifted+WorkSheet+Science"+Key%20Stage%203+free%20+%20free%20+%20free&hl=en&as_qdr=all&num=10&as_sitesearch=edu&meta=cr%3DcountryUK%7CcountryGB*	http://www.google.co.uk/search?*q=%22unbalanced+forces%22+&btnG=Search&meta=cr%3DcountryUK%7CcountryGB*	all the extra categories seemed to stop Google finding useful sites	the profile insisted on having every box checked and these stopped Google finding some sites
T9	http://www.google.co.uk/search?as_*q="equations"+"Mathematics"+Year%206%20%20%20%20%20%20%20%20(10-11%20years%20old)Both&as_filetype=&hl=English&as_qdr=Anytime&num=50AllThe%20Web&imgsz=&imgc=*	http://www.google.co.uk/search?*q=equations&meta=*	Not sure what it was trying to achieve	Searching through multiple search engines at once might be of benefit.
T10	http://www.google.co.uk/search?as_*q="Performing%20Arts"+"Art%20&%20Design"+Key%20Stage%202+free%20+%20free%20+%20free&as_filetype=&hl=en&as_qdr=all&num=50&imgsz=&imgc=*	http://www.google.co.uk/search?*q=GCSE+Performing+Arts+lesson+plan&meta=*	No faults	A menu for Dance/Performing Arts
T11	http://www.google.co.uk/search?as_*q="ICT"+"Information%20&%20Communications%20Technology"+Post%20Compulsory+free%20+%20free%20+%20free&as_filetype=&hl=en&as_qdr=all&num=50&as_sitesearch=edu&imgsz=&imgc=*	http://www.google.co.uk/search?*q=ICT+activities&meta=*	Downloading and installing software was not desirable!	Irrelevant materials not shown
T12	The wrong information was inputted	The wrong information was inputted	nothing	nothing
T13	http://www.google.co.uk/search?as_*q="quicksort"+"Information%20&%20Communications%20Technology"+Post%20Compulsory+free%20+%20free%20+%20free&as_filetype=&hl=en&as_qdr=all&num=%202&imgsz=&imgc=*	*http://www.google.co.uk/search?hl=en&sa=X&oi=spell&resnum=0&ct=result&cd=1&q=quicksort+animation&spell=1*	error message saying "one or more category missing" when i press search button even though i didn't miss anything out. the interface needs to be better so that the user knows exactly what they are doing. it didn't give the results i needed.	to be able to display a list of relevant files (e.g. gif animations) in posteach instead of having to view a website to locate the actual file. however this is not necessary
T14	The wrong information was inputted	The wrong information was inputted	when i asked for post compulsory educational level it gave me a site fro Phd level which was not at all what i wanted. Also there was not enough results found by post tech compared to Google itself	more explanation of what each button is for. e.g. it would be nice if a box comes up explaining more briefly what each button is and what it can do for me.
T15	http://www.google.co.uk/search?as_*q="Ben%20Meyer"+"Religious%20Education"+Post%20Compulsory%20%20Both&as_filetype=&hl=English&as_qdr=Anytime&num=50AllThe%20Web&imgsz=&imgc=*	http://www.google.co.uk/search?*q=Ben+Meyer&meta*	I did not understand what the words 'gray search' in red meant.	None

Note:

When making this table (transferring data from 'SurveyConsole' to this table) the researcher found that results from some open-ended questions were only presented in 'Count', 'Percentage' and 'Total'; there was no link between the individual teacher and his/her respond; it was not clear who actually said 'Yes' or 'No' just an overall figure was given.

Hence the researcher had to contact teachers +/ look for clues in teachers' individual comments and URL addresses to fill in questions 1 (c), 2, 3, 19 and 20

Moreover, given that it was not very clear who actually said 'Yes' or 'No' to further contact (question 1C) the researcher only contacted those who provided their email and whom she had previous correspondence with, in order to comply with participant's 'Privacy' rights.

Consequently, the researcher would like to point out that there may still be cases where results might have been misplaced despite her attempt to ascertain the correct position of teachers' responses for questions 1 (c), 2, 3, 19 and 20.

Question Number	The Questionnaire (Online-based)
Part 1:	**About you**
1(a)	Name
1(b)	Email Address
1 (c)	If you do NOT wish for the researcher to contact you via email Please tick this box.
1 (d)	Gender
2	At what level do you teach?
3	Please choose your subject area
4	How much teaching experience do you have, including PCGE training? *(Please write your figure inside the dotted box)*
Part 2:	**About Online materials**
5	Do you look for teaching materials online?
6	If 'No', would you consider using online materials for your teaching?
Part 3:	**New questions added**
7	What did you search for? Please type in your query below i.e. Lesson plan for year 8
8	Which search option did you select?
9	How many results did you get? i.e. 243,000,000
10	Please copy and paste the URL below
11	Did you find what you were looking for?
12	If No, what did you do next?
13	Please type in the same query in question 8 using Google search engine only; How many results did you get? i.e. 243,000,000
14	Please copy and paste the new URL below
15	Did you find what you were looking for using Google search engine?
16	If No, what did you do next?
17	Did you like the Search Tool (PoSTech)? *The first research prototype/artefact in this single case study.*
18	Did you like the interface design?
19	What did you like most about PoSTech?
20	What problems/faults did you find when using PoSTech (artefact)?
21	What other functionalities would you like to add to the menu?
22	I would prefer to .....

Appendix VII

Results from paper questionnaires (2nd iterative case study)

#	Gender	Age	Level	Subject	Experience	Do you look for online resources	If 'No' would you consider	Which Search engine do you use	How often do you search for teaching materials online	How often do you find materials	What do you like most about searching online	What do you dislike about…	I have a lot of experience in using the 'Web'	I have lot of experience in using the search engine
*T1	Female	25-29	Post-compulsory	Social sciences with humanities	4 years	Yes	N/A	Google Google Scholar Ask Jeeves AltaVista	Occasionally	Most of the time	Speed of info… Finding things… Other: work can be projected in class	Wasted time. Too many…	Mostly agree	Neither agree nor disagree
T2	Female	35-49	Post-compulsory	Religious education	4 years	Yes	N/A	Google	Once a day	Sometimes	Speed of info… The variety of …	Wasted time	Neither agree nor disagree	Neither agree nor disagree
T3	Male	50-54	Post-compulsory	Science	18 years	Yes	N/A	Yahoo Google	Occasionally	Most of the time	Speed of info… The variety of … Finding things… It makes it possible	Too many…	Mostly agree	Mostly agree
T4	Male	50-54	Post-compulsory	Other: media	5 years	Yes	N/A	Google AOL	Once a day	Most of the time	All of the above	Wasted time	Mostly agree	Mostly agree
T5	Female	30-34	Post-compulsory	Science	5 years and two months	Yes	N/A	Yahoo Google Other: mamma.com	Once a week	Most of the time	All of the above	Wasted time Other: Broken links	Strongly agree	Strongly agree
T6	Male	35-49	Post-compulsory	Mathematics	13 years	Yes	N/A	Yahoo Google	Once a week	Sometimes	The variety of … Finding things… It makes it possible	Wasted time	Mostly agree	Mostly agree
T7	Male	35-49	Secondary	Mathematics	15 years	Yes	N/A	Google	Once a month	Sometimes	The variety of … Instant success!	Wasted time Too many…	Neither agree nor disagree	Neither agree nor disagree
T8	Female	20-24	Post-compulsory	ICT	2 years and 5 month	Yes	N/A	Google	Every three-month	Sometimes	The variety of … Finding things…	Wasted time Too many…	Strongly agree	Strongly agree
T9	Female	35-49	Post-compulsory	English English with Drama	13 years	Yes	N/A	Google Ask Jeeves AltaVista	Once a month	Sometimes	Finding things…	Wasted time Too many… Cluttered	Neither agree nor disagree	Neither agree nor disagree
T10	Female	20-24	Post-compulsory	Other: psychology	2 years	Yes	N/A	Google Google Scholar Ask Jeeves	Once a day	Most of the time	All of the above	Wasted time Too many… Materials…	Mostly agree	Mostly agree
T11	Male	25-29	Post-compulsory	ICT Other: computing	4 years	Yes	N/A	Google	Once a day	Sometimes	Speed of info…	Wasted time Too many… Other: Materials with restricted access	Strongly agree	Strongly agree
T12	Female	50-54	Post-compulsory	Modern foreign languages	16 years	Yes	N/A	Google AOL	Always	Most of the time	Speed of info… The variety of … Finding things… It makes it possible	Wasted time Too many…	Mostly agree	Mostly agree
T13	Female	25-29	Secondary	Science	1 year	Yes	N/A	Yahoo Google	Once a month	Most of the time	Speed of info…	Too many… Materials…	Mostly agree	Neither agree nor disagree
T14	Female	25-29	Secondary	Business & economics education	6 years	Yes	N/A	Google	Once a month	Most of the time	Speed of info…	Wasted time Too many… Other: Commercial websites	Neither agree nor disagree	Neither agree nor disagree
T15	Female	35-49	Secondary	Art & Design English History	3 years	Yes	N/A	Yahoo Google Google Scholar AltaVista	Always	Most of the time	All of the above	Wasted time	Mostly agree	Strongly agree

#	Gender	Age	Level	Subject	Experience	Do you look for online resources	If 'No' would you consider	Which Search engine do you use	How often do you search for teaching materials online	How often do you find materials	What do you like most about searching online	What do you dislike about…	I have a lot of experience in using the 'Web'	I have lot of experience in using the search engine
T16	Female	35-49	Secondary	English	3 years	Yes	N/A	Yahoo Google Ask Jeeves	Once a week	Most of the time	Speed of info… Finings things I…	Wasted time	Mostly agree	Mostly agree
T17	Female	35-49	Secondary	Mathematics	15 years	Yes		Google	Occasionally	Most of the time	The variety of … Finding things…	Too many…	Neither agree nor disagree	Strongly agree
T18	Female	25-29	Secondary	Science	4 years	yes	N/A	Yahoo Google	Always	Most of the time	Speed of info…	Wasted time Materials…	Neither agree nor disagree	Mostly agree
T19	Female	35-49	Secondary	Modern foreign languages & Religious education	4 years	Yes	N/A	Google Google scholar	Once a week	Most of the time	Speed of info… The variety of … Instant success!	Wasted time	Neither agree nor disagree	Neither agree nor disagree
T20	Female	30-34	Primary	Generic	7 years	Yes	N/A	Yahoo Google Other: standards website i.e. BBC	Occasionally	Sometimes	Speed of info… The variety of … Finding things…	Wasted time Materials… Cluttered…	Mostly agree	Mostly agree
T21	Female	30-34	Primary	Generic	15 years	Yes	N/A	Yahoo Google AOL	Once a week	Most of the time	Speed of info… The variety of … It makes it…	Materials… Cluttered…	Mostly agree	Mostly agree
T22	Female	35-49	Primary	Generic	32 years	Yes	N/A	Yahoo Google AOL MSN ASK Jeeves	Always	Most of the time	Speed of info… The variety of … Finding things… It makes it…	Too many… Cluttered…	Mostly agree	Mostly agree
T23	Female	25-29	Primary	Generic	5 years	Yes	N/A	Yahoo Google MSN	Always	Most of the time	Speed of info… The variety of … Finding things…	Materials…	Mostly agree	Mostly agree
T24	Female	50-54	Primary	Generic	20 years	Yes	N/A	Yahoo Google Other: BBC	Always	Sometimes	The variety of… Finding things… It makes it…	Wasted time Too many… Materials…	Neither agree nor disagree	Neither agree nor disagree
T25	Female	50-54	Primary	Generic	7 years and 4 month	Yes	N/A	Yahoo Google	Once a week	Most of the time	All of the above	Wasted time Too many…	Neither agree nor disagree	Mostly agree
T26	Female	35-49	Primary	Generic	10 years	Yes	N/A	Yahoo Google	Occasionally	Sometimes	Speed of info… The variety of …	Wasted time Too many… Materials…	Strongly disagree	Strongly disagree
T27	Female	35-49	Primary	Generic	17 years	Yes	N/A	Google scholar	Once a week	Most of the time	Speed of info… It makes it…	Wasted time Too many…	Mostly agree	Neither agree nor disagree
T28	Female	35-49	Primary	Arabic	13 years	Yes	N/A	Yahoo Google Ask Jeeves	Always	Most of the time	The variety of…	Materials…	Mostly agree	Mostly agree
T29	Female	35-49	Primary	Generic	6 years	Yes	N/A	Google	Occasionally	Sometimes	Finding things… It makes it…	Wasted time Too many… Materials… Cluttered…	Mostly disagree	Neither agree nor disagree
T30	Female	25-29	Primary	Science	7 years	Yes	N/A	Google	Always	Sometimes	The variety of…	Materials…	Mostly agree	Mostly agree

* Please note notation 'T1' stands for 'Teacher Number 1'

Question Number	The structured Questionnaire
1(a)	Name
1 (b)	Gender
1 (c)	Age
2	At what level do you teach?
3	Please choose your subject area
4	How much teaching experience do you have, including PCGE training? *(Please write your figure inside the dotted box)*
5	Do you look for teaching materials online?
6	If 'No', would you consider using online materials for your teaching?
7	Which search engines do you use/have experience of using? (you may fill more than one circle)
8	How often do you search for teaching materials online?
9	When you search online on average how often do you find the materials you were looking for?
10	What do you like most about searching online for your teaching materials? *(you may select more than one)*
11	When searching online for your teaching materials, what features or characteristics do you dislike? *(you may fill more than circle)*
12	Think about the following two statements and choose your answer accordingly[1].

[1] This question was adopted from Madden, Eaglestone, Ford and Whittle's study (unpublished), titled as the 'Ground truthing of transaction logs: verification of observations derived from search engine transaction logs'.

Appendix VII

Results from observation schedules (2nd iterative case study)

Starting Info

Observation information

ID:
Teacher 1

Onset Time:
12 : 45 pm

Location:
College

Duration:
19 minutes

Task 1

Search information	1st search	2nd search	3rd search	4th search	5th search	6th search	7th search	8th search	9th search	10th search
Query typed	Max Weber	The protestant ethic and the spirit of capitalism	Calvinism and capitalism							
Boolean operators used	None	None – and is only used as part of the query	None – and is only used as part of the query							
Search option/s used; that is options that were changed from default option to their selected options	Any Subject : Social Science With Humanaities Show All of Results… Was changed to 10 per page	No option was changed	No option was changed							

	AltaVista										*Search Tool*									
	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th
WebPages viewed	2	1	1								1	2	1							
Links clicked	1	0	0								1	4	2							
Search results found	Where relevant search result/s was bookmarked																			
Page number	None	N/A	N/A								none	None	None							
Link (position)	-	-	-								-	-	-							
Type of resources found	-	-	-								-	-	-							
Total number of WebPages bookmarked by the teacher	Zero										Zero									

Task 2

1st search	2nd search	3rd search	4th search	5th search	6th search	7th search	8th search	9th search	10th search
Same as before	The protestant ethic and the spirit of capitalism	The protestant ethic and the spirit of capitalism	Max Weber	A2 Sociology	Religious in sociology	Sociology of family	Family		
None – and is only used as part of the query	None – and is only used as part of the query	None – and is only used as part of the query	None	None	None	None	None		
Looking for 'Free' resources Any file type = 'pdf' Age gropu = Post-composlory Region = 'England'	No option was changed	Reource Type = Video	Reource Type = any resource type	No option was changed	No option was changed	No option was changed	No option was changed		

	AltaVista										*Search Tool*									
	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th
WebPages viewed	Zero found	Zero found	Zero found	Zero found	2	2	2	2			1	1	Zero found	2	1	1	1	1		
Links clicked	0	0	N/A	N/A	0	0	0	0			0	0	N/A	0	0	0	0	2		
Search results found	Where relevant search result/s was bookmarked																			
Page number	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A			None	None	N/A	N/A	N/A	N/A	N/A	None		
Link (position)	-	-	-	-	-	-	-	-			-	-	-	-	-	-	-	-		
Type of resources found	-	-	-	-	-	-	-	-			-	-	-	-	-	-	-	-		
Total number of WebPages bookmarked by the teacher	Zero										Zero									

Starting Info

Observation information

ID:
Teacher 2

Onset Time:
15 : 54 pm

Location:
College

Duration:
19:30 minutes

Task 1

Search information	1st search	2nd search	3rd search	4th search	5th search	6th search	7th search	8th search	9th search	10th search
Query typed	aqa religious studie gce past paper questions	aqa religious studies gce past paper questions ('s' was added)	jahliyya	jahliyya in modern day	is jahliyya still present	Same as before	pre Islamic arabia			
Boolean operators used	None	None	None	None	None	None	None			
Search option/s used; that is options that were changed from default option to their selected options	None was selected	No option was changed	No option was changed	Any Subject = Relious Studies Results in 'english language only Show All of my results= one single page Looking for 'Free' resources	No option was changed	Any resource type = deafult	No option was changed			

	AltaVista										*Search Tool*									
	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th
WebPages viewed	2	1	1	Zero found	1	1	1				1	2	1	Zero found	1	1	1			
Links clicked	1	0	0	N/A	0	0	0				1	4	2	N/A	0	1	1			
Search results found	Where relevant search result/s was bookmarked																			
Page number	None	N/A	N/A	N/A	N/A	N/A	N/A				none	None	None	N/A	N/A	None	1			
Link (position)	-	-	-	-	-	-	-				-	-	-	-	-	-	5th			
Type of resources found	-	-	-	-	-	-	-				-	-	-	-	-	-	Text			
Total number of WebPages bookmarked by the teacher	Zero										One									

Task 2

1st search	2nd search	3rd search	4th search	5th search	6th search	7th search	8th search	9th search	10th search
Same as before	Same as before								
Website = educational sites Age group = Compulsory Region = 'england' Resource type = worksheet + homework	Resource type = no follow ups								

	AltaVista										*Search Tool*									
	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th
WebPages viewed	1	1									Zero found	4								
Links clicked	0	0									N/A	1								
Search results found	Where relevant search result/s was bookmarked																			
Page number	N/A	N/A									N/A	None								
Link (position)	-	-									-	-								
Type of resources found	-	-									-	-								
Total number of WebPages bookmarked by the teacher	Zero										Zero									

Starting Info	Task 1										Task 2									
Observation information	**Search information**	**1st search**	**2nd search**	**3rd search**	**4th search**	**5th search**	**6th search**	**7th search**	**8th search**	**9th search**	**10th search**	**1st search**	**2nd search**	**3rd search**	**4th search**	**5th search**	**6th search**	**7th search**	**8th search**	**9th search**	**10th search**
ID: Teacher 3	Query typed	Hardy Weinberg equation, questions										Same as before									
Onset Time: 12 : 50 pm	Boolean operators used	Comma as part of the statement																			
Location: College	Search option/s used; that is options that were changed from default option to their selected options	Any Subject = Science Results in 'english language only Show All of my results= 10 search results										Looking for = free resources only Resource type= animation File type= pdf Site=educational Student=gifted and talented Age group=post compulsory Follow-up= worksheet									
Duration: 26:27 minutes		***AltaVista***										***AltaVista***									
		1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th
	WebPages viewed	1										1									
	Links clicked	3										6									
	Search results found	Where relevant search result/s was bookmarked										Where relevant search result/s was bookmarked									
	Page number	1										1									
	Link (position)	1										7									
	Type of resources found	Text										Quiz									
	Total number of WebPages bookmarked by the teacher	One										One									

		Search Tool										***Search Tool***									
		1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th
	WebPages viewed	1										Zero found									
	Links clicked	3										N/A									
	Search results found	Where relevant search result/s was bookmarked										Where relevant search result/s was bookmarked									
	Page number	1										N/A									
	Link (position)	4										-									
	Type of resources found	Animation/ multimedia										-									
	Total number of WebPages bookmarked by the teacher	One										Zero									

Starting Info

Observation information

ID:
Teacher 4

Onset Time:
13 : 47 pm

Location:
College

Duration:
32:11 minutes

Task 1

Search information	1st search	2nd search	3rd search	4th search	5th search	6th search	7th search	8th search	9th search	10th search
Query typed	examples/names of films which caused controversy	examples/names of frecent ilms which caused controversy (typo error)	examples/names of recent ilms which caused controversy (type error)	names of recent ilms which caused controversy (type error)						
Boolean operators used	None, the sign or was used as part of the query	Same as before	Same as before	None						
Search option/s used; that is options that were changed from default option to their selected options	Any Subject = Art & Design	No option was changed	No option was changed	No option was changed						

	AltaVista										*Search Tool*									
	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th
WebPages viewed	1	Zero found	1	1							3	Zero found	1	3						
Links clicked	1	N/A/	1	0							4	N/A	0	0						
Search results found	Where relevant search result/s was bookmarked																			
Page number	None	N/A	None	N/A							1st	1st	2nd	N/A	N/A	N/A				
Link (position)	-	-	-	-							4	5	1	-	-	-				
Type of resources found	-	-	-	-							DVD	Text	Text	-	-	-				
Total number of WebPages bookmarked by the teacher	Zero										Three									

Task 2

Search information	1st search	2nd search	3rd search	4th search	5th search	6th search	7th search	8th search	9th search	10th search
Query typed	names of recent films which caused controversy (type error)									
Boolean operators used										
Search option/s used; that is options that were changed from default option to their selected options	Results per page = Show me 50 search results Age group = Compulsory									

	AltaVista										*Search Tool*									
	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th
WebPages viewed	2										1									
Links clicked	5										0									
Search results found	Where relevant search result/s was bookmarked																			
Page number	1st	1st	1st	2nd	2nd						N/A									
Link (position)	1	3	4	3	6						-									
Type of resources found	Text	Text	Films	Text	Text						-									
Total number of WebPages bookmarked by the teacher	Five										Zero									

Starting Info

Observation information

ID:
Teacher 5

Onset Time:
15 : 15 pm

Location:
College

Duration:
15:24 minutes

Task 1

Search information	1st search	2nd search	3rd search	4th search	5th search	6th search	7th search	8th search	9th search	10th search
Query typed	gravitational fields									
Boolean operators used	None									
Search option/s used; that is options that were changed from default option to their selected options	Any Subject = Science Results in 'english language only Show All of my results= one single page Looking for 'Free' resources									

	AltaVista										*Search Tool*									
	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th
WebPages viewed	1										1									
Links clicked	1										0									
Search results found	Where relevant search result/s was bookmarked																			
Page number	None										N/A									
Link (position)	-										-									
Type of resources found	-										-									
Total number of WebPages bookmarked by the teacher	Zero										Zero									

Task 2

Search information	1st search	2nd search	3rd search	4th search	5th search	6th search	7th search	8th search	9th search	10th search
Query typed	Same as before	gravity	gravity applets	magnetism applets	gravity applets					
Boolean operators used	None	None	None	None	**None**					
Search option/s used; that is options that were changed from default option to their selected options	Reosurce type= video Video time = > 1 Minute	No option was changed	No option was changed	No option was changed	Resource type = any resource type					

	AltaVista										*Search Tool*									
	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th
WebPages viewed	1	1	Zero found	Zero found	1						Zero found	2	Zero found	Zero found	1					
Links clicked	0	0	N/A	N/A	0						N/A	1	N/A	N/A	0					
Search results found	Where relevant search result/s was bookmarked																			
Page number	N/A	N/A	-	-	N/A						N/A	None	N/A	N/A	None					
Link (position)	-	-	-	-	-						-	-	-	-	-					
Type of resources found	-	-	-		-						-	-	-	-	-					
Total number of WebPages bookmarked by the teacher	Zero										Zero									

Starting Info

Observation information

ID:
Teacher 6

Onset Time:
19 : 09 pm

Location:
College

Duration:
10:45 minutes

Task 1

Search information	1st search	2nd search	3rd search	4th search	5th search	6th search	7th search	8th search	9th search	10th search
Query typed	HISTOGRAM WITH UNEQUAL CLASS INTERVALS									
Boolean operators used	With is used as part of the query									
Search option/s used; that is options that were changed from default option to their selected options	Any Subject = Mathematics Results in 'english language only Show All of my results= one single page Looking for 'Free' resources									

	AltaVista										*Search Tool*									
	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th
WebPages viewed	1										1									
Links clicked	4										2									
Search results found	Where relevant search result/s was bookmarked																			
Page number	1st	1st									None									
Link (position)	4	7									-									
Type of resources found	Graphs and text	pdf									-									
Total number of WebPages bookmarked by the teacher	Two										Zero									

Task 2

1st search	2nd search	3rd search	4th search	5th search	6th search	7th search	8th search	9th search	10th search
Same as before									
Age group = Compulsory Resource that inlcudes = worksheet + homework									

	AltaVista										*Search Tool*									
	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th
WebPages viewed	1										Zero found									
Links clicked	1										N/A									
Search results found	Where relevant search result/s was bookmarked																			
Page number	N/A										-									
Link (position)	-										-									
Type of resources found	-										-									
Total number of WebPages bookmarked by the teacher	Zero										Zero									

Starting Info		Task 1										Task 2									
Observation information	**Search information**	**1st search**	**2nd search**	**3rd search**	**4th search**	**5th search**	**6th search**	**7th search**	**8th search**	**9th search**	**10th search**	**1st search**	**2nd search**	**3rd search**	**4th search**	**5th search**	**6th search**	**7th search**	**8th search**	**9th search**	**10th search**
ID: Teacher 7 **Onset Time:** 18 : 18 pm **Location:** College **Duration:** 21:59 minutes	Query typed	probability	probability for gce students	probability lesson for gce students								Same as before	probability lesson for A-LEVEL students								
	Boolean operators used	None	None	None								**N/A**	None; only capitalising words was used								
	Search option/s used; that is options that were changed from default option to their selected options	Resource type= Lesson plan Website = educational sites	No option was changed	No option was changed								Any Subject = Mathematics Results in 'english language only Show All of my results= 50 search results Looking for 'Free' resources Age group = Post Compulsory Region = 'England' Resource that includes = worksheet + homework	Resource type = no follow ups								
		AltaVista										***AltaVista***									
		1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th
	WebPages viewed	1	1	1								1	1								
	Links clicked	0	3	0								0	3								
	Search results found	Where relevant search result/s was bookmarked										Where relevant search result/s was bookmarked									
	Page number	N/A	None	N/A								N/A	N/A								
	Link (position)	-	-	-								-	-								
	Type of resources found	-	-	-								-	-								
	Total number of WebPages bookmarked by the teacher	Zero										Zero									
		Search Tool										***Search Tool***									
		1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th
	WebPages viewed	1	1	1								Zero found	Zero found								
	Links clicked	2	1	0								N/A	N/A								
	Search results found	Where relevant search result/s was bookmarked										Where relevant search result/s was bookmarked									
	Page number	none	None	N/A								N/A	N/A								
	Link (position)	-	-	-								-	-								
	Type of resources found	-	-	-								-	-								
	Total number of WebPages bookmarked by the teacher	Zero										Zero									

Starting Info

Observation information

ID:
Teacher 8

Onset Time:
19 : 45 pm

Location:
College

Duration:
16:05 minutes

Task 1

Search information	1st search	2nd search	3rd search	4th search	5th search	6th search	7th search	8th search	9th search	10th search
Query typed	ms word table of content	ms word table of content homework								
Boolean operators used	None	None								
Search option/s used; that is options that were changed from default option to their selected options	Any Subject = ICT Results in 'english language only Show All of my results= one single page Resources Suitable for = SEN students Looking for 'Free' resources Age group = Compulsory Resource that inlcudes = worksheet + homework	No option was changed								

	AltaVista										*Search Tool*									
	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th
WebPages viewed	1	1									Zero found	Zero found								
Links clicked	2	1									N/A	N/A								
Search results found	Where relevant search result/s was bookmarked																			
Page number	1	1	None								N/A	N/A								
Link (position)	2	6	-								-	-								
Type of resources found	Tables	Tables	-								-	-								
Total number of WebPages bookmarked by the teacher	Two										Zero									

Task 2

Search information	1st search	2nd search	3rd search	4th search	5th search	6th search	7th search	8th search	9th search	10th search
	ms word 2003 table of content	Same as before								
	None	N/A								
	Website = All WebSites Age group = Any stuent age Region = Any reigion Age group= Year 9 (13-14 years ols)	Suitable for SEN students								

	AltaVista										*Search Tool*									
	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th
	1	1									1	Zero found								
	3	0									1	N/A								
	Where relevant search result/s was bookmarked																			
	None	N/A									1	N/A								
	-	-									1	-								
	-	-									Tables in PowerPoint format	-								
	Zero										One									

Starting Info

Observation information

ID:
Teacher 9

Onset Time:
13 : 02 pm

Location:
College

Duration:
20:49 minutes

Task 1

Search information	1st search	2nd search	3rd search	4th search	5th search	6th search	7th search	8th search	9th search	10th search
Query typed	poetry of the romantic movement									
Boolean operators used	None									
Search option/s used; that is options that were changed from default option to their selected options	Any Subject = English Looking for 'Free' resources									

	AltaVista										*Search Tool*									
	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th
WebPages viewed	2										3									
Links clicked	2										2									
Search results found	Where relevant search result/s was bookmarked																			
Page number	2										1	3								
Link (position)	9										6	5								
Type of resources found	Text										Text	Text (encyclopaedia)								
Total number of WebPages bookmarked by the teacher	One										Two									

Task 2

Search information	1st search	2nd search	3rd search	4th search	5th search	6th search	7th search	8th search	9th search	10th search
Query typed	john clare and poetry of the romantic period									
Boolean operators used	None; and was used as part of the query									
Search option/s used; that is options that were changed from default option to their selected options	Website = educational sites Age group = Compulsory									

	AltaVista										*Search Tool*									
	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th
WebPages viewed	1										3									
Links clicked	3										0									
Search results found	Where relevant search result/s was bookmarked																			
Page number	1	1									N/A									
Link (position)	5	7									-									
Type of resources found	Text (news)	Text									-									
Total number of WebPages bookmarked by the teacher	Two										Zero									

Starting Info

Observation information

ID:
Teacher 10

Onset Time:
13 : 03 pm

Location:
College

Duration:
13:23 minutes

Task 1

Search information	1st search	2nd search	3rd search	4th search	5th search	6th search	7th search	8th search	9th search	10th search
Query typed	personality development	Same as before								
Boolean operators used	None	None								
Search option/s used; that is options that were changed from default option to their selected options	Any Subject = Social Science with Humanities Results in 'english language only Show All of my results= 5 search results per page Looking for 'Free' resources	Any Subject = Sience								

	AltaVista										*Search Tool*									
	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th
WebPages viewed	1	1									1	1								
Links clicked	1	1									1	1								
Search results found	Where relevant search result/s was bookmarked																			
Page number	None	1									None	None								
Link (position)	-	4									-	-								
Type of resources found	-	Text									-	-								
Total number of WebPages bookmarked by the teacher	One										Zero									

Task 2

1st search	2nd search	3rd search	4th search	5th search	6th search	7th search	8th search	9th search	10th search
Same as before	Same as before	Same as before							
N/A	N/A	N/A							
Resource that includes=Lesson Plans Age group = Compulsory Stuent type= Region = 'England' Resources that inlcudes = worksheet	Student type= Any student type	Resource type = worksheet and Homwork							

	AltaVista										*Search Tool*									
	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th
WebPages viewed	1	1	1								1	1	Zero found							
Links clicked	0	0	0								0	0	N/A							
Search results found	Where relevant search result/s was bookmarked																			
Page number	N/A	N/A	N/A								N/A	N/A	N/A							
Link (position)	-	-	-								-	-	-							
Type of resources found	-	-	-								-	-	-							
Total number of WebPages bookmarked by the teacher	Zero										Zero									

Starting Info

Observation information

ID:
Teacher 11

Onset Time:
16 : 11 pm

Location:
College

Duration:
25:20 minutes

Task 1

Search information	1st search	2nd search	3rd search	4th search	5th search	6th search	7th search	8th search	9th search	10th search
Query typed	binary search animation									
Boolean operators used	None									
Search option/s used; that is options that were changed from default option to their selected options	No option was selected									

	AltaVista										*Search Tool*									
	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th
WebPages viewed	1										1									
Links clicked	0										3									
Search results found	Where relevant search result/s was bookmarked																			
Page number	N/A										None									
Link (position)	-										-									
Type of resources found	-										-									
Total number of WebPages bookmarked by the teacher	Zero										Zero									

Task 2

Search information	1st search	2nd search	3rd search	4th search	5th search	6th search	7th search	8th search	9th search	10th search
Query typed	Binary search	GCSE ICT edexcel exam	tcp ip protocol stack	visual basic						
Boolean operators used	None	None	None	None						
Search option/s used; that is options that were changed from default option to their selected options	Results in 'english language only Resource type= animations File type = .ppt Site from= educational sites	Subject= ICT Resource type= any resource type Free resources only	Subject= any subject Resource type= diagrams File type = any file type Age= post compulsory	Resources that include = worksheets Age group= any age						

	AltaVista										*Search Tool*									
	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th
WebPages viewed	1	1	1	1							5	4	2	4						
Links clicked	0	0	0	0							3	2	0	0						
Search results found	Where relevant search result/s was bookmarked																			
Page number	N/A	N/A	N/A	N/A							1	None	N/A	N/A						
Link (position)	-	-	-	-							1	-	-	-						
Type of resources found	-	-	-	-							PowerPoint	-	-	-						
Total number of WebPages bookmarked by the teacher	Zero										One									

Starting Info

Observation information

ID:
Teacher 12

Onset Time:
11 : 51 pm

Location:
College

Duration:
28:30 minutes

Task 1

Search information	1st search	2nd search	3rd search	4th search	5th search	6th search	7th search	8th search	9th search	10th search
Query typed	arabic grammar	adjectives								
Boolean operators used	None	None								
Search option/s used; that is options that were changed from default option to their selected options	No option was selected	Same as before								

	AltaVista										*Search Tool*									
	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th
WebPages viewed	1	1									1	1								
Links clicked	2	0									1	0								
Search results found	Where relevant search result/s was bookmarked																			
Page number	1	N/A									None	N/A								
Link (position)	2	-									-	-								
Type of resources found	Text	-									-	-								
Total number of WebPages bookmarked by the teacher	One										Zero									

Task 2

1st search	2nd search	3rd search	4th search	5th search	6th search	7th search	8th search	9th search	10th search
adjectives in arabic									
N/A									
Show results per page = 10 Looking for = free resoruces only File type = .txt Sites= Educational sites Resource Student type=ESL National curriculum= england Resource that includes = worksheet									

	AltaVista										*Search Tool*									
	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th
WebPages viewed	2										2									
Links clicked	1										4									
Search results found	Where relevant search result/s was bookmarked																			
Page number	N/A										None									
Link (position)	-										-									
Type of resources found	-										-									
Total number of WebPages bookmarked by the teacher	Zero										Zero									

Starting Info

Observation information

ID:
Teacher 13

Onset Time:
16 : 56 pm

Location:
College

Duration:
17:18 minutes

Task 1

Search information	1st search	2nd search	3rd search	4th search	5th search	6th search	7th search	8th search	9th search	10th search
Query typed	different forms of energy	different types of electricity generation								
Boolean operators used	None	None								
Search option/s used; that is options that were changed from default option to their selected options	Any Subject = Science Results in 'english language only	No option was changed								

	AltaVista										*Search Tool*									
	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th
WebPages viewed	1	1									1	1								
Links clicked	2	2									4	5								
Search results found	Where relevant search result/s was bookmarked																			
Page number	None	None									1	1								
Link (position)	-	-									3	2								
Type of resources found	-	-									Text	Text and diagram								
Total number of WebPages bookmarked by the teacher	Zero										Two									

Task 2

1st search	2nd search	3rd search	4th search	5th search	6th search	7th search	8th search	9th search	10th search
Same as before									
N/A									
WebSite= Educational Sites Age group = Year 9 National curriculum = 'England'									

	AltaVista										*Search Tool*									
	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th
WebPages viewed	1										2									
Links clicked	0										3									
Search results found	Where relevant search result/s was bookmarked																			
Page number	N/A										N/A									
Link (position)	-										-									
Type of resources found	-										-									
Total number of WebPages bookmarked by the teacher	Zero										Zero									

Starting Info

Observation information

ID:
Teacher 14

Onset Time:
17 : 47 pm

Location:
College

Duration:
20: 00 minutes

Task 1

Search information	1st search	2nd search	3rd search	4th search	5th search	6th search	7th search	8th search	9th search	10th search
Query typed	marketing									
Boolean operators used	None									
Search option/s used; that is options that were changed from default option to their selected options	Any Subject = Business & Economics Education Results in 'english language only Looking for 'Free' resources Resource Type= Lesson plans									

	AltaVista										*Search Tool*									
	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th
WebPages viewed	2										2									
Links clicked	1										1									
Search results found	Where relevant search result/s was bookmarked																			
Page number	None										None									
Link (position)	-										-									
Type of resources found	-										-									
Total number of WebPages bookmarked by the teacher	Zero										Zero									

Task 2

Search	1st search	2nd search	3rd search	4th search	5th search	6th search	7th search	8th search	9th search	10th search
Same as before										
N/A										
WebSites= Educational Sites										

	AltaVista										*Search Tool*									
	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th
WebPages viewed	1										3									
Links clicked	0										3									
Search results found	Where relevant search result/s was bookmarked																			
Page number	N/A										N/A									
Link (position)	-										-									
Type of resources found	-										-									
Total number of WebPages bookmarked by the teacher	Zero										Zero									

Starting Info		Task 1										Task 2									
Observation information	**Search information**	**1st search**	**2nd search**	**3rd search**	**4th search**	**5th search**	**6th search**	**7th search**	**8th search**	**9th search**	**10th search**	**1st search**	**2nd search**	**3rd search**	**4th search**	**5th search**	**6th search**	**7th search**	**8th search**	**9th search**	**10th search**
ID: Teacher 15 **Onset Time:** 10: 03 am **Location:** School **Duration:** 13:08 minutes	Query typed	oliver twist lesson plan	child labour Victorian era lesson plan									child labour 18 centuary england									
	Boolean operators used	None	None									None									
	Search option/s used; that is options that were changed from default option to their selected options	No option was selected	Same as before									Any Subject = English Looking for 'Free' resources Resource type= Lesson Plans Age group = year 8 National curriculm= England Uploaded= Last 'Eight Months' Resource include = worksheet and Homwork File type= HTML									
		AltaVista										***Search Tool***									
		1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th
	WebPages viewed	1	1									1	1								
	Links clicked	0	1									1	1								
	Search results found	Where relevant search result/s was bookmarked																			
	Page number	N/A	None									None	None								
	Link (position)	-	-									-	-								
	Type of resources found	-	-									-	-								
	Total number of WebPages bookmarked by the teacher	Zero										Zero									
		AltaVista										***Search Tool***									
		1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th
	WebPages viewed	2										Zero found									
	Links clicked	0										N/A									
	Search results found	Where relevant search result/s was bookmarked																			
	Page number	N/A										-									
	Link (position)	-										-									
	Type of resources found	-										-									
	Total number of WebPages bookmarked by the teacher	Zero										Zero									

Starting Info

Observation information

ID:
Teacher 16

Onset Time:
10 : 43 am

Location:
School

Duration:
19: 04 minutes

Task 1

Search information	1st search	2nd search	3rd search	4th search	5th search	6th search	7th search	8th search	9th search	10th search
Query typed	citizenship year 7									
Boolean operators used	None									
Search option/s used; that is options that were changed from default option to their selected options	No option was changed or selected.									

	AltaVista										*Search Tool*									
	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th
WebPages viewed	1										1									
Links clicked	3										0									
Search results found	Where relevant search result/s was bookmarked																			
Page number	None										N/A									
Link (position)	-										-									
Type of resources found	-										-									
Total number of WebPages bookmarked by the teacher	Zero										Zero									

Task 2

1st search	2nd search	3rd search	4th search	5th search	6th search	7th search	8th search	9th search	10th search
animal rights									
N/A									
Any Subject = Citizenship Results in 'english language only Looking for 'Free' resources Age=Year 7									

	AltaVista										*Search Tool*									
	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th
WebPages viewed	2										1									
Links clicked	1										1									
Search results found	Where relevant search result/s was bookmarked																			
Page number	1	2	2								1	1	1							
Link (position)	4	1	6								3	5	6							
Type of resources found	Text	Text	Text								Videos and DVDs	Text	Videos							
Total number of WebPages bookmarked by the teacher	Three										Three									

Starting Info

Observation information

ID:
Teacher 17

Onset Time:
11 : 48 am

Location:
College

Duration:
10: 40 minutes

Task 1

Search information	1st search	2nd search	3rd search	4th search	5th search	6th search	7th search	8th search	9th search	10th search
Query typed	fraction									
Boolean operators used	None									
Search option/s used; that is options that were changed from default option to their selected options	Any Subject = Mathematics Results in 'english language only Looking for 'Free' resources									

	AltaVista										*Search Tool*									
	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th
WebPages viewed	1										1									
Links clicked	2										1									
Search results found	Where relevant search result/s was bookmarked																			
Page number	1										1									
Link (position)	4										8									
Type of resources found	Text/graph										pdf									
Total number of WebPages bookmarked by the teacher	One										One									

Task 2

1st search	2nd search	3rd search	4th search	5th search	6th search	7th search	8th search	9th search	10th search
Same as before									
N/A									
File type=pdf WebSites= Educational Sites Student= gifted or talented Age= year 9 National currriculum= England Resources that includes= worksheet									

	AltaVista										*Search Tool*									
	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th
WebPages viewed	1										1									
Links clicked	0										2									
Search results found	Where relevant search result/s was bookmarked																			
Page number	N/A										None									
Link (position)	-										-									
Type of resources found	-										-									
Total number of WebPages bookmarked by the teacher	Zero										Zero									

Starting Info

Observation information

ID:
Teacher 18

Onset Time:
13 :19 pm

Location:
College

Duration:
17: 47 minutes

Task 1

Search information	1st search	2nd search	3rd search	4th search	5th search	6th search	7th search	8th search	9th search	10th search
Query typed	Fossils Fuels									
Boolean operators used	None									
Search option/s used; that is options that were changed from default option to their selected options	Any Subject = Sciecne Results in 'english language only Looking for 'Free' resources									

	AltaVista										*Search Tool*									
	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th
WebPages viewed	1										1									
Links clicked	2										2									
Search results found	Where relevant search result/s was bookmarked																			
Page number	1										1									
Link (position)	5										5									
Type of resources found	Text/pictures										Videos									
Total number of WebPages bookmarked by the teacher	One										One									

Task 2

1st search	2nd search	3rd search	4th search	5th search	6th search	7th search	8th search	9th search	10th search
Same as before									
N/A									
Resource Type= ICT Student type= SEN Age= year 8 Resoruces that includes= worksheet and homework									

	AltaVista										*Search Tool*									
	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th
1											Zero found									
2											N/A									
Where relevant search result/s was bookmarked																				
None											N/A									
-											-									
-											-									
Zero											Zero									

Starting Info

Observation information

ID:
Teacher 19

Onset Time:
17 : 47 pm

Location:
School

Duration:
23: 58 minutes

Task 1

Search information	1st search	2nd search	3rd search	4th search	5th search	6th search	7th search	8th search	9th search	10th search
Query typed	islamic education key stage 3 uk									
Boolean operators used	None									
Search option/s used; that is options that were changed from default option to their selected options	No search option was selected/changed									

	AltaVista										*Search Tool*									
	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th
WebPages viewed	1										3									
Links clicked	1										0									
Search results found	Where relevant search result/s was bookmarked																			
Page number	None										N/A									
Link (position)	-										-									
Type of resources found	-										-									
Total number of WebPages bookmarked by the teacher	Zero										Zero									

Task 2

1st Search	2nd search	3rd search	4th search	5th search	6th search	7th search	8th search	9th search	10th search
arabic gcse	free arabic materials for secondary school use								
N/A									
Any Subject = Modern Foreign Languages Results in 'english language only Show me= 5 search reuslts per page Looking for 'Free' resources Resource Type= Lesson plans Region= enagland	No option was changed								

	AltaVista										*Search Tool*									
	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th
WebPages viewed	1	1									1	4								
Links clicked	1	1									0	1								
Search results found	Where relevant search result/s was bookmarked																			
Page number	None	None									N/A	None								
Link (position)	-	-									-	-								
Type of resources found	-	-									-	-								
Total number of WebPages bookmarked by the teacher	Zero										Zero									

Starting Info		Task 1										Task 2									
Observation information	**Search information**	**1st search**	**2nd search**	**3rd search**	**4th search**	**5th search**	**6th search**	**7th search**	**8th search**	**9th search**	**10th search**	**1st search**	**2nd search**	**3rd search**	**4th search**	**5th search**	**6th search**	**7th search**	**8th search**	**9th search**	**10th search**
ID: Teacher 20 **Onset Time:** 12 : 45 pm **Location:** College **Duration:** 19: 48 minutes	Query typed	Thermal insulators	writing newspaper reports									Same as before									
	Boolean operators used	None	**None**									N/A									
	Search option/s used; that is options that were changed from default option to their selected options	Any Subject = Science Resource Type= pictures Picture size=Medium Picture colour = Full coulur Search within the = Web	Any Subject = English Resource Type= Lesson Plans									Results in 'english language only Looking for 'Free' resources WebSites= educationa Student type= ESL Age= Year National curriculum= Englamd Within= Last Week only Resources that includes= WorkSheet and HomeWork									
		AltaVista										***Search Tool***									
		1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th
	WebPages viewed	1	1									1	2								
	Links clicked	3	2									0	1								
	Search results found	Where relevant search result/s was bookmarked										Where relevant search result/s was bookmarked									
	Page number	None	1	1								N/A	1								
	Link (position)	-	4	7								-	3								
	Type of resources found	-	Text	Multimedia								-	Text								
	Total number of WebPages bookmarked by the teacher	Two										One									

	AltaVista										***Search Tool***									
	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th
WebPages viewed	1										Zero found									
Links clicked	N/A										N/A									
Search results found	Where relevant search result/s was bookmarked																			
Page number	N/A										N/A									
Link (position)	-										-									
Type of resources found	-										-									
Total number of WebPages bookmarked by the teacher	Zero										Zero									

Starting Info

Observation information

ID:
Teacher 21

Onset Time:
14 : 06 pm

Location:
School

Duration:
31: 40 minutes

Task 1

Search information	1st search	2nd Search	3rd search	4th search	5th search	6th search	7th search	8th search	9th search	10th search
Query typed	Digestive System	circulatoty System	Circulatory System							
Boolean operators used	None	None	None							
Search option/s used; that is options that were changed from default option to their selected options	Any Subject = Science Show me= 10 search reuslts per page Resource Type= Video	No option was changed	No option was changed							

	AltaVista										*Search Tool*									
	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th
WebPages viewed	1	Zero found	2								1	Zero found	1							
Links clicked	3	N/A	1								0	N/A	1							
Search results found	Where relevant search result/s was bookmarked																			
Page number	1	N/A	None								N/A	N/A	N/A							
Link (position)	1	-	-								-	-	-							
Type of resources found	Video	-	-								-	-	-							
Total number of WebPages bookmarked by the teacher	One										Zero									

Task 2

Search information	1st search	2nd search	3rd search	4th search	5th search	6th search	7th search	8th search	9th search	10th search
Query typed	Same as before									
Boolean operators used	N/A									
Search option/s used; that is options that were changed from default option to their selected options	Video type= Quicktime WebSites= educational websotes National curriculum= enagland Age= Year Resources that includes= homework									

	AltaVista										*Search Tool*									
	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th
WebPages viewed	1										Zero found									
Links clicked	1										N/A									
Search results found	Where relevant search result/s was bookmarked																			
Page number	None										N/A									
Link (position)	-										-									
Type of resources found	-										-									
Total number of WebPages bookmarked by the teacher	Zero										Zero									

Starting Info

Observation information

ID:
Teacher 22

Onset Time:
12 : 46 pm

Location:
School

Duration:
38: 36 minutes

Task 1

Search information	1st search	2nd search	3rd search	4th search	5th search	6th search	7th search	8th search	9th search	10th search
Query typed	year 6 literacy									
Boolean operators used	None									
Search option/s used; that is options that were changed from default option to their selected options	No search option was selected									

	AltaVista										*Search Tool*									
	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th
WebPages viewed	1										1									
Links clicked	2										0									
Search results found	Where relevant search result/s was bookmarked																			
Page number	None										N/A									
Link (position)	-										-									
Type of resources found	-										-									
Total number of WebPages bookmarked by the teacher	Zero										Zero									

Task 2

Search information	1st search	2nd search	3rd search	4th search	5th search	6th search	7th search	8th search	9th search	10th search
Query typed	apostrophe	strategy	strategy	policies						
Boolean operators used	N/A	N/A	N/A	**N/A**						
Search option/s used; that is options that were changed from default option to their selected options	Any Subject = English Resource Type= Any File type= HTML Age= year 6	All previous option were back to defauls Site= Governmnetal sites	All previous option were back to defauls Site= educational sites	No options was changed						

	AltaVista										*Search Tool*									
	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th
WebPages viewed	1	1	1	1							1	4	1	1						
Links clicked	1	1	0	0							4	1	0	0						
Search results found	Where relevant search result/s was bookmarked																			
Page number	None	None	N/A	N/A							1	1	N/A	N/A	N/A					
Link (position)	-	-	-	-							2	3	-	-	-					
Type of resources found	-	-	-	-							Text /multimedia	Same as before	-	-	-					
Total number of WebPages bookmarked by the teacher	Zero										Two									

Starting Info		Task 1										Task 2									
Observation information	**Search information**	**1st search**	**2nd search**	**3rd search**	**4th search**	**5th search**	**6th search**	**7th search**	**8th search**	**9th search**	**10th search**	**1st search**	**2nd search**	**3rd search**	**4th search**	**5th search**	**6th search**	**7th search**	**8th search**	**9th search**	**10th search**
ID: Teacher 23 **Onset Time:** 15 : 32 pm **Location:** School **Duration:** 20: 58 minutes	Query typed	roman britain	romans and celts	hadrians wall	roman invasion	romans	Same as before	Same as before	Same as before			Task one and two were performed at once									
	Boolean operators used	None	And was used part of the query	None	None	none	N/A	N/A	N/A												
	Search option/s used; that is options that were changed from default option to their selected options	Results in 'english language only Show me= 5 search reuslts per page Looking for 'Free' resources Resource Type= Video Video type= Real Student type= SEN Age= year 3 Region= enagland Uploaded within last= eight months Togather with= Worksheets and HomeWork	No options was changed	No option was changed	No option was changed	No option was changed	No option was changed	No option was changed	No option was changed												

	AltaVista										***Search Tool***										***AltaVista***										***Search Tool***									
	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th
WebPages viewed	1	1	1	1	1	1	1	1			Zero found	Zero found	Zero found	Zero found	Zero found	Zero found	Zero found	1	1																						
Links clicked	1	0	1	1	0	0	0	0			N/A	N/A	N/A	N/A	N/A	N/A	N/A	1	1																						
Search results found	Where relevant search result/s was bookmarked																				Where relevant search result/s was bookmarked																		
Page number	None	N/A	None	None	N/A	N/A	N/A	N/A			N/A	N/A	N/A	N/A	N/A	N/A	N/A	1	1																					
Link (position)	-	-	-	-	-	-	-	-			-	-	-	-	-	-	-	10	7																					
Type of resources found	-	-	-	-	-	-	-	-			-	-	-	-	-	-	-	Text	Multimedia																					
Total number of WebPages bookmarked by the teacher	Zero										Two																													

Starting Info		Task 1										Task 2									
Observation information	**Search information**	**1st search**	**2nd search**	**3rd search**	**4th search**	**5th search**	**6th search**	**7th search**	**8th search**	**9th search**	**10th search**	**1st search**	**2nd search**	**3rd search**	**4th search**	**5th search**	**6th search**	**7th search**	**8th search**	**9th search**	**10th search**
ID: Teacher 24 **Onset Time:** 10 : 33 am **Location:** School **Duration:** 20: 32 minutes	Query typed	science parts of the human body	science parts of the human body ks 1									Parts of the human body ks 1									
	Boolean operators used	None	None									N/A									
	Search option/s used; that is options that were changed from default option to their selected options	No option was changed	No option was changed									Any Subject = Science Results in 'english language only Show me= 10 search reuslts per page Resource Type= Lesson plans WebSites= Educational Sites Age= year 1 & 2 National Curriculum= enagland Resources that includes= Worksheet + Howmwork									
		AltaVista										***Search Tool***									
		1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th
	WebPages viewed	1	1									1									
	Links clicked	1	2									2									
	Search results found	Where relevant search result/s was bookmarked																			
	Page number	None	1									N/A	N/A								
	Link (position)	-	1									-	-								
	Type of resources found	-	Slide show									-	-								
	Total number of WebPages bookmarked by the teacher	One										Zero									

AltaVista										***Search Tool***									
1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th
1										Zero found									
0										N?A									
Where relevant search result/s was bookmarked																			
N/A										N/A									
-										-									
-										-									
Zero										Zero									

Starting Info

Observation information

ID:
Teacher 25

Onset Time:
12 : 22 pm

Location:
School

Duration:
14: 16 minutes

Task 1

Search information	1st search	2nd search	3rd search	4th search	5th search	6th search	7th search	8th search	9th search	10th search
Query typed	great fire of london 1666									
Boolean operators used	None									
Search option/s used; that is options that were changed from default option to their selected options	No search option was selected									

	AltaVista										*Search Tool*									
	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th
WebPages viewed	1										1									
Links clicked	5										0									
Search results found	Where relevant search result/s was bookmarked																			
Page number	1										N/A									
Link (position)	2										-									
Type of resources found	News/stories										-									
Total number of WebPages bookmarked by the teacher	One										Zero									

Task 2

Search information	1st search	2nd search	3rd search	4th search	5th search	6th search	7th search	8th search	9th search	10th search
Query typed	Same as before	Same as before								
Boolean operators used	N/A	N/A								
Search option/s used; that is options that were changed from default option to their selected options	Any Subject = History Results in 'english language only Looking for 'Free' resources Resource Type= Animation File type= pdf Age= year 1 & 2 National curriculum= enagland Resources that includes= worksheet	File type= HTML Togather with= Worksheets and Homeworks								

	AltaVista										*Search Tool*									
	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th
WebPages viewed	1	1									Zero found	Zero found								
Links clicked	0	0									N/A	N/A								
Search results found	Where relevant search result/s was bookmarked																			
Page number	N/A	N/A									N/A	N/A								
Link (position)	-	-									-	-								
Type of resources found	-	-									-	-								
Total number of WebPages bookmarked by the teacher	Zero										Zero									

Starting Info		Task 1										Task 2									
Observation information	**Search information**	**1st search**	**2nd search**	**3rd search**	**4th search**	**5th search**	**6th search**	**7th search**	**8th search**	**9th search**	**10th search**	**1st search**	**2nd search**	**3rd search**	**4th search**	**5th search**	**6th search**	**7th search**	**8th search**	**9th search**	**10th search**
ID: Teacher 26	Query typed	Maths-shape										Maths									
Onset Time: 09 : 32 am	Boolean operators used	None										None									
Location: School	Search option/s used; that is options that were changed from default option to their selected options	Subjects= Mathematics Search in =English language only Show = 5 results per page Looking for= free reosurces only Resource type= Animations WebSites= Educational sites Student type= ESL Age= PreSchool Esources that includes= Worksheet and Homework										No option was changed									
Duration: 13: 24 minutes		***AltaVista***										***Search Tool***									
		1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th
	WebPages viewed	1										1									
	Links clicked	0										0									
	Search results found	Where relevant search result/s was bookmarked										Where relevant search result/s was bookmarked									
	Page number	N/A										N/A									
	Link (position)	-										-									
	Type of resources found	-										-									
	Total number of WebPages bookmarked by the teacher	Zero										Zero									

Task 2																					
AltaVista										***Search Tool***									
1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th
1										Zero found									
0										N/A									
Where relevant search result/s was bookmarked																			
N/A										N/A									
-										-									
-										-									
Zero										Zero									

Starting Info

Observation information

ID:
Teacher 27

Onset Time:
10 : 12 am

Location:
School

Duration:
09: 32 minutes

Task 1

Search information	1st search	2nd search	3rd search	4th search	5th search	6th search	7th search	8th search	9th search	10th search
Query typed	hajj									
Boolean operators used	None									
Search option/s used; that is options that were changed from default option to their selected options	No option was selected									

	AltaVista										*Search Tool*									
	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th
WebPages viewed	1										1									
Links clicked	0										0									
Search results found	Where relevant search result/s was bookmarked																			
Page number	N/A										N/A									
Link (position)	-										-									
Type of resources found	-										-									
Total number of WebPages bookmarked by the teacher	Zero										Zero									

Task 2

Search information	1st search	2nd search	3rd search	4th search	5th search	6th search	7th search	8th search	9th search	10th search
Same as before	N/A									
Subjects= Arts & Design Search in =English language only Show = 5 results per page Looking for= free reosurces only Resource type=Pictures Image type= Medium Image colour= full colour Age= year 5 Resources that includes = Worksheet										

	AltaVista										*Search Tool*									
	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th
WebPages viewed	1										Zero found									
Links clicked	4										N/A									
Search results found	Where relevant search result/s was bookmarked																			
Page number	1	1	1								N/A									
Link (position)	7	2	9								-									
Type of resources found	Article/picture										-									
Total number of WebPages bookmarked by the teacher	Three										Zero									

Starting Info

Observation information

ID:
Teacher 28

Onset Time:
12 : 36 pm

Location:
School

Duration:
11: 15 minutes

Task 1

Search information	1st Search	2nd search	3rd search	4th search	5th search	6th search	7th search	8th search	9th search	10th search
Query typed	wiggle and waglle	MR wiglle and waglle								
Boolean operators used	None	and is part of the query								
Search option/s used; that is options that were changed from default option to their selected options	Subjects= Religious Education Resoruce type= Poems	Subjects= English								

	AltaVista										*Search Tool*									
	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th
WebPages viewed	1	1									1	Zero found								
Links clicked	0	0									0	N/A								
Search results found	Where relevant search result/s was bookmarked																			
Page number	N/A	N/A									None	N/A								
Link (position)	-	-									-	-								
Type of resources found	-	-									-	-								
Total number of WebPages bookmarked by the teacher	Zero										Zero									

Task 2

1st search	2nd search	3rd search	4th search	5th search	6th search	7th search	8th search	9th search	10th search
MR wiggle and waggle [spelling was changed]									
and is part of the query									
No option was changed/added									

	AltaVista										*Search Tool*									
	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th
WebPages viewed	1										1									
Links clicked	1										1									
Search results found	Where relevant search result/s was bookmarked																			
Page number	None										None									
Link (position)	-										-									
Type of resources found	-										-									
Total number of WebPages bookmarked by the teacher	Zero										Zero									

Starting Info

Observation information

ID:
Teacher 29

Onset Time:
12 : 47 pm

Location:
School

Duration:
15: 15 minutes

Task 1

Search information	1st search	2nd search	3rd search	4th search	5th search	6th search	7th search	8th search	9th search	10th search
Query typed	writing	Sea picture								
Boolean operators used	None	None								
Search option/s used; that is options that were changed from default option to their selected options	Subject= Religious Education	No option was selected/changed								

	AltaVista										*Search Tool*									
	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th
WebPages viewed	1	1									1	1								
Links clicked	0	0									0	0								
Search results found	Where relevant search result/s was bookmarked																			
Page number	N/A	N/A									N/A	N/A								
Link (position)	-	-									-	-								
Type of resources found	-	-									-	-								
Total number of WebPages bookmarked by the teacher	Zero										Zero									

Task 2

Search information	1st search	2nd search	3rd search	4th search	5th search	6th search	7th search	8th search	9th search	10th search
Query typed	Same as before									
Boolean operators used	N/A									
Search option/s used; that is options that were changed from default option to their selected options	Resource type=Pictures Image colour= full colour									

	AltaVista										*Search Tool*									
	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th
WebPages viewed	1										Zero found									
Links clicked	1										N/A									
Search results found	Where relevant search result/s was bookmarked																			
Page number	None										N/A									
Link (position)	-										-									
Type of resources found	-										-									
Total number of WebPages bookmarked by the teacher	Zero										Zero									

Starting Info		Task 1										Task 2									
Observation information	**Search information**	**1st search**	**2nd search**	**3rd search**	**4th search**	**5th search**	**6th search**	**7th search**	**8th search**	**9th search**	**10th search**	**1st search**	**2nd search**	**3rd search**	**4th search**	**5th search**	**6th search**	**7th search**	**8th search**	**9th search**	**10th search**
ID: Teacher 30	Query typed	What are the factors that friction depends on?										Same as before	Same as before	friction							
Onset Time: 15 : 58 pm	Boolean operators used	None										N/A	N/A	N/A							
Location: School	Search option/s used; that is options that were changed from default option to their selected options	Subject= Science										Search in =English language only Resource type=Movies Video time= 1 Minutes Video type= Flash Resource type= .ppt WebSite= Educational Sites Age= year 6 National curriculum= England Within the= last Months Resources that includes= Worksheet	Movie type= WindowsMedia	No option was changed/added							
Duration: 19: 55 minutes		***AltaVista***										***AltaVista***									
		1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th
	WebPages viewed	1										Zero found	Zero found	3							
	Links clicked	1										N/A	N/A	1							
	Search results found	Where relevant search result/s was bookmarked										Where relevant search result/s was bookmarked									
	Page number	1										N/A	N/A	1	3						
	Link (position)	8										-	-	4	16 (4th row)						
	Type of resources found	Movie/text										-	-	Movie	Movie /video						
	Total number of WebPages bookmarked by the teacher	One										Two									

		Search Tool									
		1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th
	WebPages viewed	2									
	Links clicked	2									
	Search results found	Where relevant search result/s was bookmarked									
	Page number	None									
	Link (position)	-									
	Type of resources found	-									
	Total number of WebPages bookmarked by the teacher	Zero									

		Search Tool									
		1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th
	WebPages viewed	Zero found	Zero found	Zero found							
	Links clicked	N/A	N/A	N/A							
	Search results found	Where relevant search result/s was bookmarked									
	Page number	N/A	N/A	N/A							
	Link (position)	-	-	-							
	Type of resources found	-	-	-							
	Total number of WebPages bookmarked by the teacher	Zero									

Appendix VII

Codes and themes generated from interview transcripts

Subject

	Agree	Disagree	Neutral	
Arts & Hum	5	–	2	= 7 $\frac{2}{3}$ more than half
Science & Tech	14	1	7	= 23 $\frac{2}{11}$ ★

(more than half)

'Science & Technology' teachers did have considerably more web experience than 'Arts & Humanities' teachers. 18 of the 14 'Science & Technology' teachers agreed to having a lot of experience in using the web and only 5 Arts & Humanities teachers did. On the other hand, in the 'Science & technology' category 7 other teachers had average web experience (selected Neutral) with only 2 teachers in the 'Arts & Humanities' category who expressed 'neutral' feelings about their web experience, suggesting that 'Arts & Humanities' teachers have more web experience than Science & technology teachers, however, recall the main question is concerned is there are important number of teachers in each subject category groups.

Experience

	Agree	Disagree	Neutral	
below mean	12	1	5	= 18
above mean	7	1	4	= 12.

(9 years & 2 months)

Teachers with teaching experience below the mean had a lot more web experience than those with their with teaching experience above the mean. suggesting that teachers with teaching experience not the more experienced teachers are more skilled web users than the more experienced teachers, which could possibly be due to their recent web training i.e. perhaps web training comes or as a result of their having completing their B degree course (BSc), teacher training, or or at university

However, one has to be careful when analysing this question we should be as the researcher was cautious in making the above suggestions as in the results it is not teachers' perceptions of individual teachers' web & its experience was based on the individual teachers' understanding of web & its required skills. technology.

Gender/

	Agree	Disagree	Natural
M	4	–	1
F	15	2	8

Q web

"I have a lot of experience in using the 'web'."

8 out of the 25 participants in the question

Out of the 14 female teachers who participated in the question, 4 (1/3) female teachers rated their web skills as 'natural' or 'average' with 2 indicating disagreeing with having a lot of web experience. The female teachers expressed their lack of ability in using web, by choosing the Disagree. Male teachers were confident agreed with the statement 'I have a lot of experience in using the 'web', with the remaining one teacher neutral. This is 4 & 5 web experience as average or Natural or average.

Suggesting that female teachers are less experienced than male teachers, however,

* Any categories were dropped for every of analysis.

due to the incapacity of the sample it is not possible to be sure this theory further develop

Age/

	Agree	Disagree	Natural
20-34	10	–	2
35+	9	2	7

for example, if 5 more Male teachers at the mixed Male teacher are either agreeing or neutral, I have a lot of web experience in the place than skills in the Natural category, however we probable to have disagree we could not be certain to say that the rest 5 set of male teachers worked the web skills continue the same pattern

Teacher age between 20-34 were found to have agree web

The majority of teacher age between 20-34 had a lot of experience in using the web in comparison to teacher age 35+ as 10 out of the 12 teacher age between 20-34 agree to the statement 'I have a lot of ... with the remaining 2 teachers Saying 'natural' web experience

Level/

	Agree	Disagree	Natural
Pri	7	2	2
Sec	3	–	5
post	9	–	2

post-compulsory teacher were had the most web experience, however the Secondary teacher & primary teacher were the least experienced web users with 2 of the third which indicated 2 teachers ... were found to have

Teaching experience: ~~The number of teachers with their teaching experience~~ (Q7)

~~The difference between teachers~~

number of teachers below the mean being slightly more than those with teaching experience above the mean (B)

There was not significant difference / unique pattern found between teachers experience, as both teachers below ~~the mean~~ & above mean with teaching experience were found to have used mainly Google ~~Search engine~~ followed by the Yahoo Search engine & ~~However~~ with, not (B)

Age of

Teachers ~~about the~~ age of 35 & were found to have used more ~~Good~~

Google, Google Scholar, MSN Search, Altavista, Yahoo, MSL, Msn and ~~other~~ (BBC / msnn.com) were used by teachers ~~both~~ Age between 20-34 + 35 & . The only difference was that teachers age 35 & were found to have used the Search engines more than ~~the number of~~ teachers age between 20-34.

Search engine

~~The number of teachers use~~ ~~Search engines usage per Search engine was~~ almost 1/3 more than those teachers age between 20-34.

The number of 35 + teachers ~~used~~ per Search engine was more than ~~those~~ teachers age (20-34); teachers usage per Search engine was almost

~~with teachers (age 35 &) using~~

with ~~with~~ Google & ~~than~~ Yahoo ~~being~~ ~~were mainly used by those teachers~~ ranking as that but a Small change of ~~more teachers age 35 & were found to have~~ be ~~used~~ Search engine.

~~The number of more than~~

~~The usage of~~ More among Search engine usage of teachers age 35 & ~~were~~ across all of the ~~above~~ ✓ method. Search engine were found to be more than those teachers age between 20-34.

expertise

Similarly, majority of teachers with best of experience in web + Search engine was found among Google users in comparison to the other 7 Search engine followed by Yahoo (2)

~~In total there was~~ ~~Go~~ in Google 18 teachers Said I have a Lot of experience and the remaining nine teachers Says 'Neutral', ~~Expertise~~ average Skills + Experts Claims to have in using the web.

The number of teachers ~~expertise~~ agreeing to have a Lot of experience in using the Search engine was 19 ~~not more than~~ with one teacher Says Lacking Skills Says 'disagree' in Search engine usage.

Gender/

	Always	once a day/week	once a month	Every 3 months +	never
M	–	3	1	1	–
F	8	8	4	6	–

Female teachers were searching online for teaching materials considerably more than Male teachers, as 16 teachers were found to be searching online 'Always' to 'once a week' ~~while only 3 teachers were f~~ in comparison to the 3 male teachers, see table reported in this questionnaire.

Age/

	Always	once a day/week		once a month	Every 3 months +	never
20-34	3	4	(7)	2	2	–
35+	5	7	(12)	2	5	–

Teachers age 35+ were using search engine more than ~~their~~ three teachers ~~age~~ ranged between the age of 20-34 ~~as~~ as almost twice the number of teachers age were found to be searching online for teaching materials online (12) 35+ (12 teachers in total) Always – once a week.

Level/

	Always	once a day/week		once a month	Every 3 months +	never
Pri	5	3	(8)	1	3	–
Sec	2	2	(4)	2	1	–
Post	1	6	(7)	2	3	– (~~search engine~~ online Searchers (users))

All ~~the~~ 3 ~~of~~ teachers in ~~the~~ found to be graph Searched online for ~~their~~ teaching materials, however, primary teachers were ~~ranked~~ the most frequent ~~users~~ ~~out of the 3 level~~ among in comparison to Secondary & post compulsory teachers, see table.

~~Supervisor suggested~~ Teachers' ~~level of~~ subject (curriculum) ~~data~~ can influence teachers' ~~online Searching for~~ usage of teaching materials ~~as~~ ~~pattern and theme~~ needed for post-compulsory teaching were ranked as 8 primary teachers, twice the number of Secondary teachers & eight ~~post~~ teachers ~~post compulsory~~ Searching regularly for

Teaching Experience/

Always once a day/week ~~once a month~~ ~~Every 3 months +~~ never

Teaching Experience / * How often do you search for teaching materials online? (Q 8 a)

	Always	once a day/week	once a month	Every 3 months	never
below 9.2	4	8 (12)	2	4	-
above 9.2	4	3 (7)	2	3	-

- Contrasted to constant online teachers

Suggesting Teachers with less teaching experience tend to search

There was no significant difference between/direct role

Teachers' number of years of teaching experience

The results could possibly be due to the irregularity of sample size of this question

Teachers' below or above the teaching experience were equally Years of teaching experience did not have a direct or indirect significant impact on teachers online searching for materials, however, overall it can be said that

web experience / Teachers with teaching experience below the mean were searching more often than those above the mean, found to be more regular users

	Always	once a day/week	once a month	Every 3 months	never
Agree	7	8 (17)	1	4	-
Disagree	-	-		2	-
Natural	1	3	3	1	-

3 Teachers who were frequently online searching, searching online and indeed mainly interacting with Search engines were found to be a point a 'lot' of web + Search engine experiences.

There was not much different between 'Always' and 'once a day/week' users

Search experience / Teacher web + Search engine experience did not significantly differ among the 'Always' and 'once a day/week' online Searchers (users) however, There was a positive correlation between teachers' frequency of use and increase experience. especially or (web + Search engine) 1

Search tool + confident

	Always	once a day/week	once a month	Every 3 months	never
Agree	6	8	-	4	-
Disagree	-	-	-	1	-
Natural	2	3	4	2	-

Suggesting that frequent use of by Search engine/online Search, as teachers' Search the more an individual teacher Searches online. The more he/she will be gaining skills & experiences which 3.

Q8(b)

Subjects

	Always	once a day/week	once a month	Every 3 months	never
Arts + Humanities	3	~~5~~ 3	1	-	-
Science + Tech	5	8	3	7	-

overall, teachers' teaching Science & technology subjects were ~~found to be~~ considerably more ~~be~~ considerably Searching more than those teaching Art & Humanities subjects.

Suggesting that ~~teacher's~~ Science & tech teachers' need for online Searching & thus ~~needs more~~ ~~adoption of~~ consumption of online resources are greater than Arts & Humanities teachers, which could ~~+ therefore online~~ Searching possibly be due to the nature of their individual subjects ~~unlike the~~ ~~indeed the~~ subjects indeed than National curriculum specification.

on average how often do you find the materials for your work?

(a) Gender

	Most of the time	Sometimes	once a month +
M	2	3	-
F	17	8	-

Probably because they are not both frequent & regular

in this questionnaire female teachers are able to find more often than their male colleagues, suggesting that female teachers are better internet searchers than male teachers or are possibly more patient, prepared to sit behind the computer & go through many website (search results) or both.

Age/

	Most of the time	Sometimes	once a month +
20-34	8	4	-
35 +	11	7	-

20-34 teachers age ranged between

Teachers age 35 + were more able to successful in finding online materials for their teaching, suggesting that the (table) teachers were the notion that older teachers have more web + search engine experience? Check this with web – age experience.

level/

	Most of the time	Sometimes	once a month +
Pri	6	5	-
Sec	7	1	-
post	6	5	-

* Teachers success in finding level relevant/useful to online teaching materials across the majority of pri, sec & post about teachers were not significantly different reported to have found relevant/useful online teaching materials 'most of the time'

* Secondary teachers' were less successful in finding regular basis able to find the least

Subjects/

	Most of the time	Sometimes	once a month +
Arts + Hum	6	1	-
Science + Tech	13	10	-

both frequent & regular

numerous Secondary teachers who use Search online on regular basis were the least successful less able to find online resources relevant which could possibly be due to these nature of

web/

	Most of the time	Sometimes	once a week +
Agree	14	5	-
Disagree	-	2	-
Natural	5	4	-

Teacher who were able to find online teaching material most of the time had a lot of experience in both web + search engine.

Teachers who only able to find teaching material sometimes had a lot of experience; again suggesting a negative correlation between teachers' web + search engine experience and ability to find useful online teaching materials.

	Most of the time	Sometimes	once a week +
Agree	14	5	-
Disagree	-	1	-
Natural	5	5	-

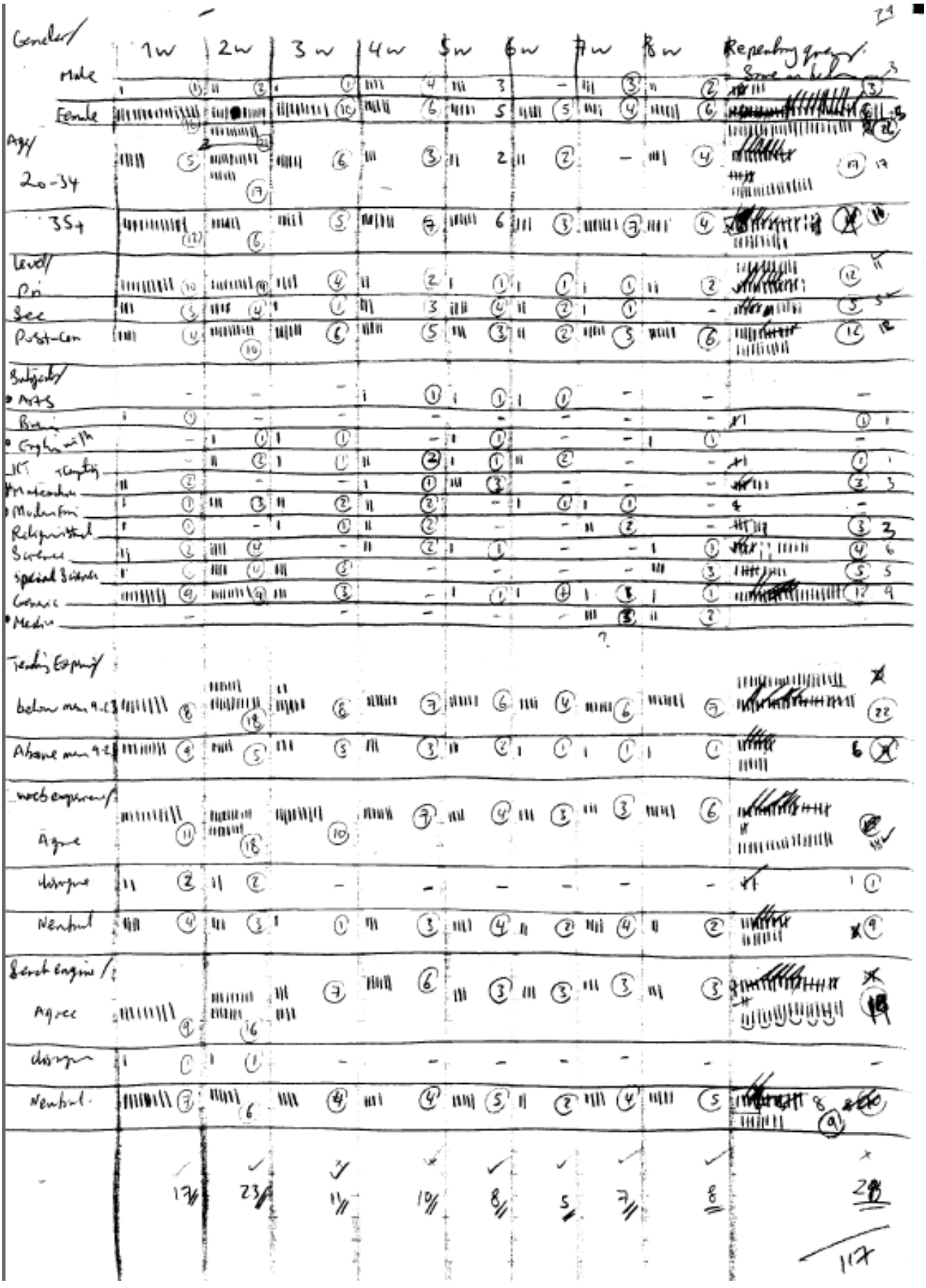
hypothesis

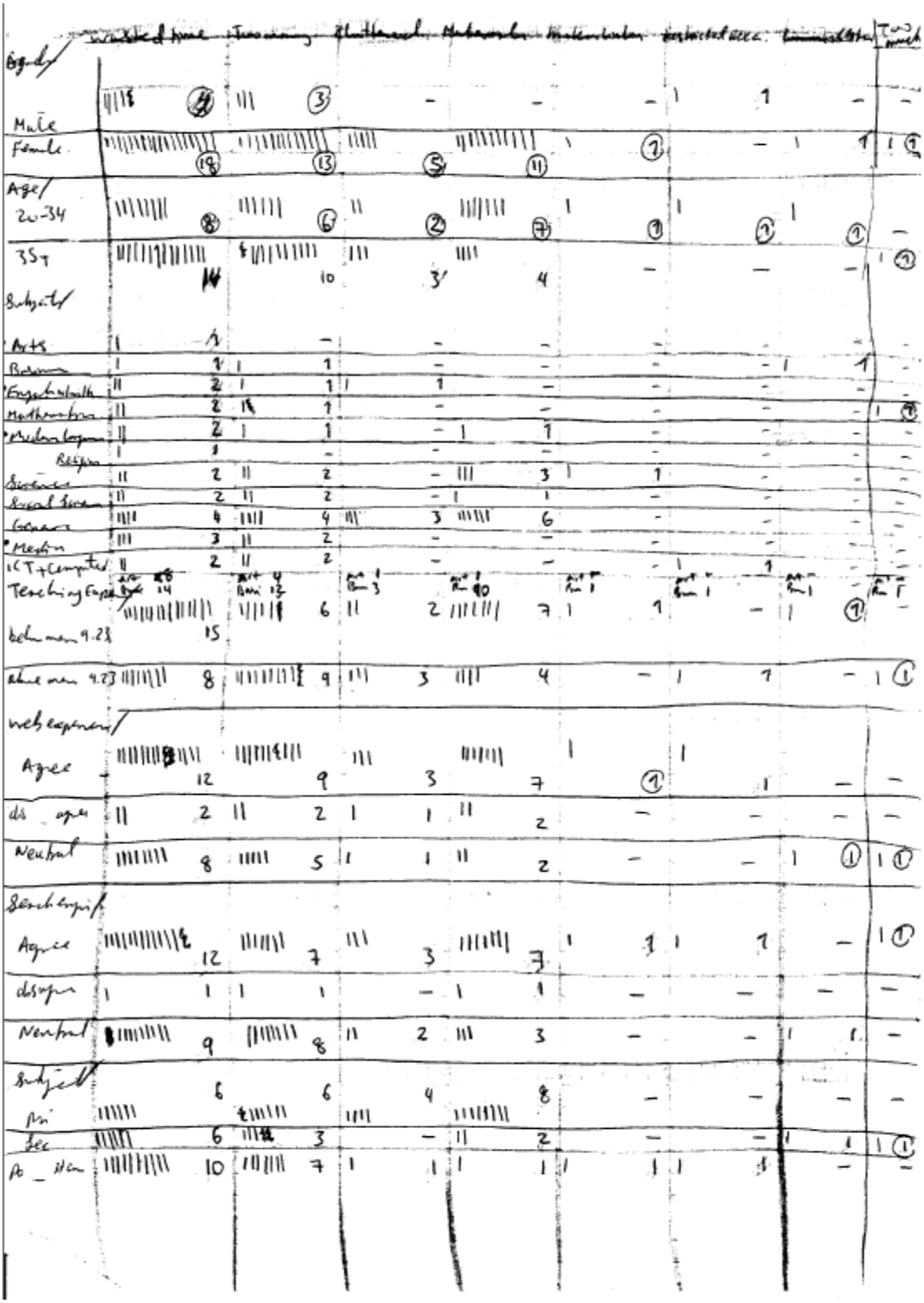
Science a technology teacher were reported to be more successful at finding online teaching material than those teaching Arts + Humanities.

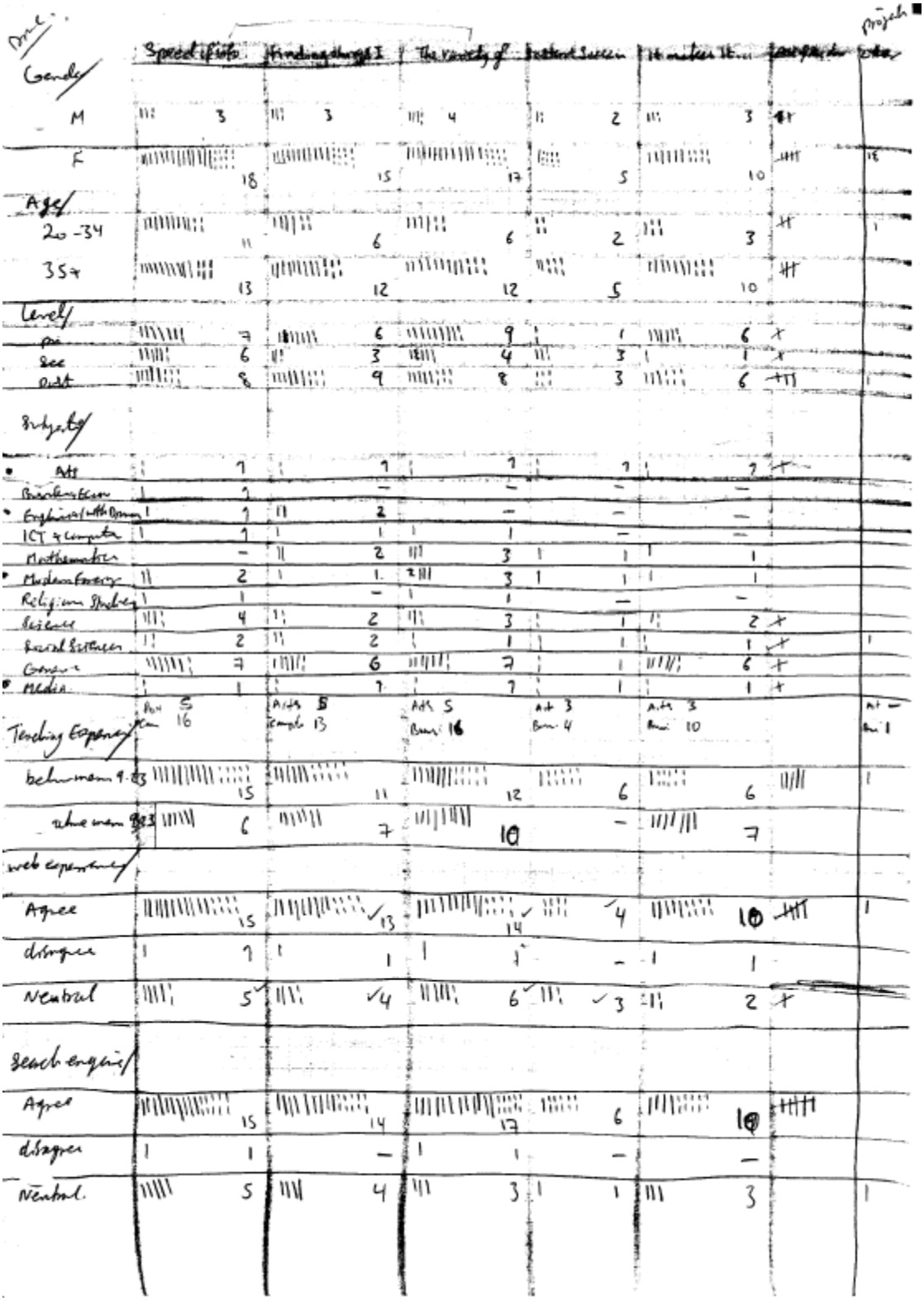
Science a technology teacher who were able to find online teaching 'most of the time' more than double compared to the Art + Human teacher.

at the end they will be confirmed or rejected in the light of Art + Human.

or use the word frequent for most of the time.


Gender/
1w
2w
3w
4w
5w
6w
7w
8w
Repeating group
Male
Female
Age/
20-34
35+
Level/
Pri
Sec
Post-Sec
Subjects/
Arts
Business
Engineering
ICT
Mathematics
Medicine
Religious Studies
Science
special Needs
Generic
Medium
Teaching Experience/
below min 9-23
Above min 9-23
work experience/
Agree
disagree
Neutral
Secret Engine/
Agree
disagree
Neutral

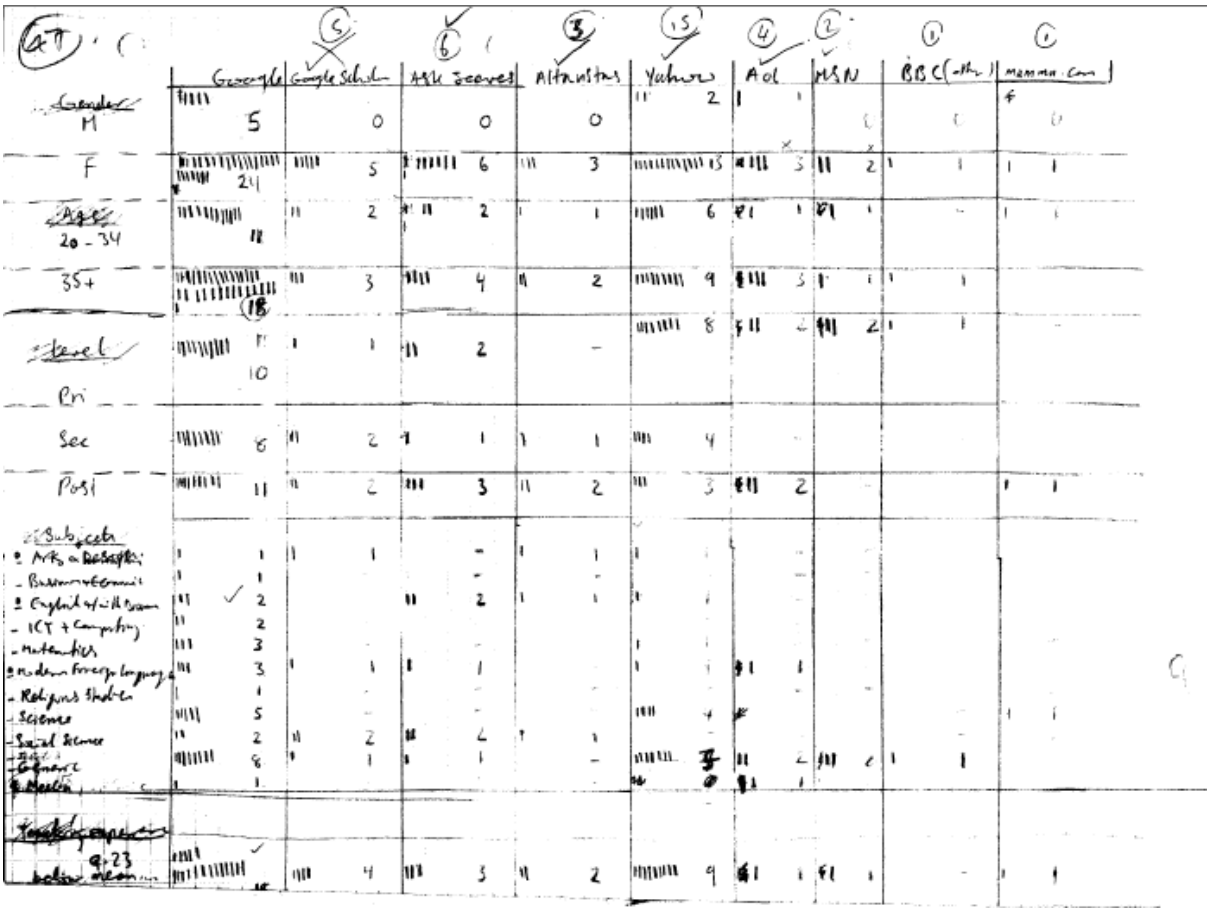




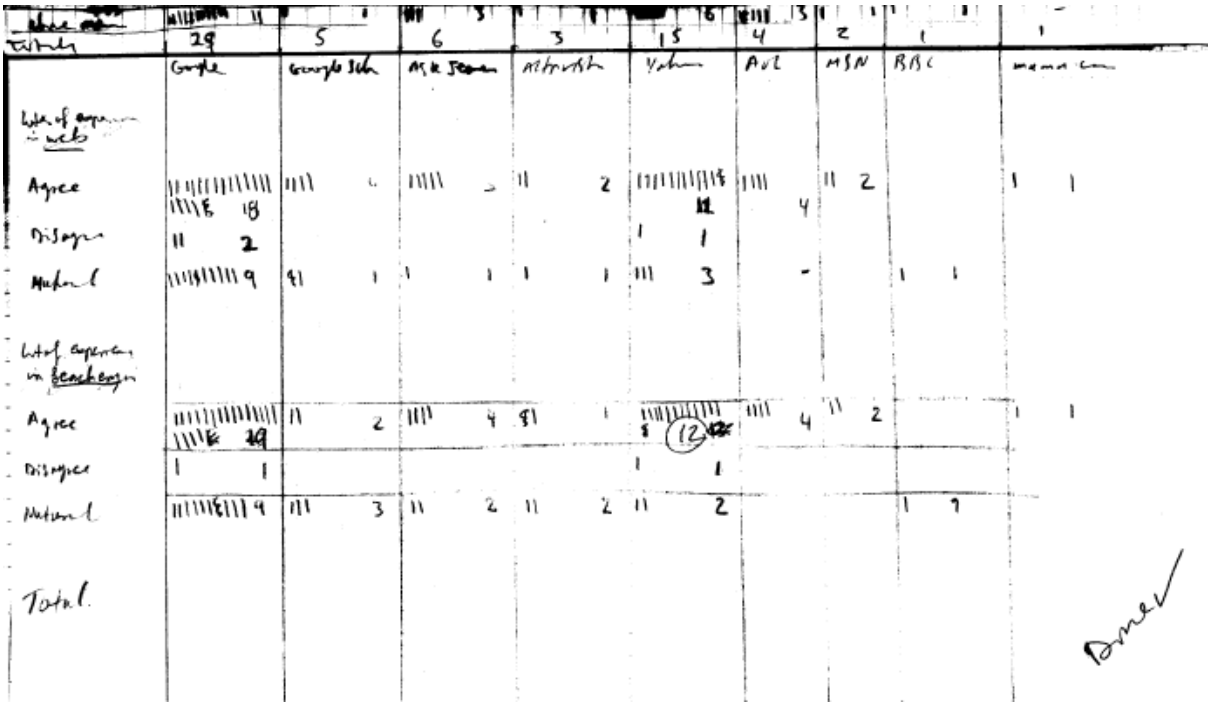
Web

	Agree	Disagree	Neutral
Gender			
M	4		1
F	15	2	8
Age			
20-34	10		2
35+	9	2	7
Level			
Pri	7 ✓	2	2 ✓
Sec	5 ✓		5
Pri +	4		2
Subjects			
Arabic + Dari	1		
Business + Economics			1
English + Irish	1		1
ICT + Computing	1		
Mathematics	1		2
Religious Education	2		1
Religious Studies			1
Science	4		1
Social Science			
General	5	2	2
Media	1		
Experience			
below mean 9.23	12	1	3
Above mean 9.23	7	1	1
Total	19	2	9

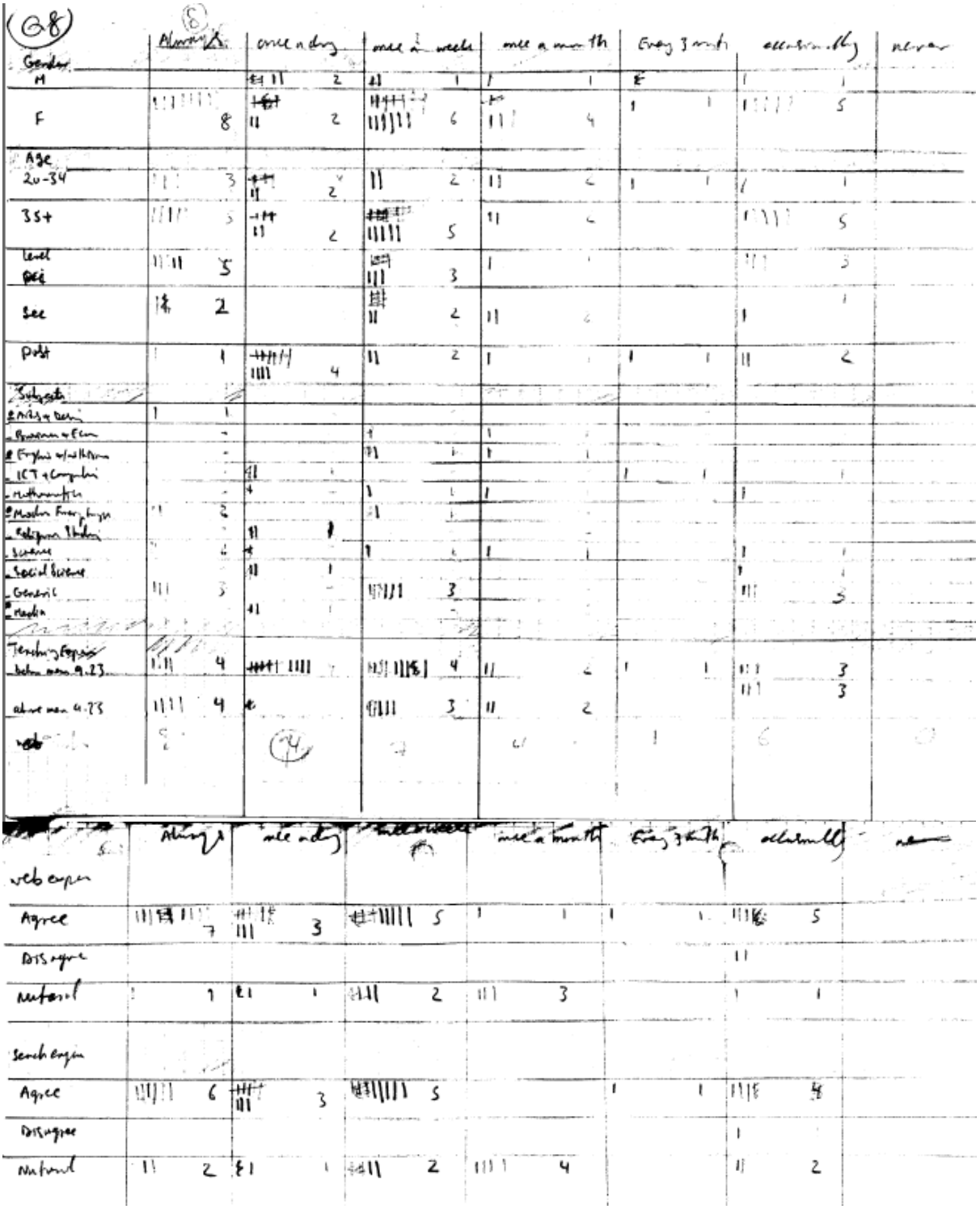
M = 5
F = 25
30

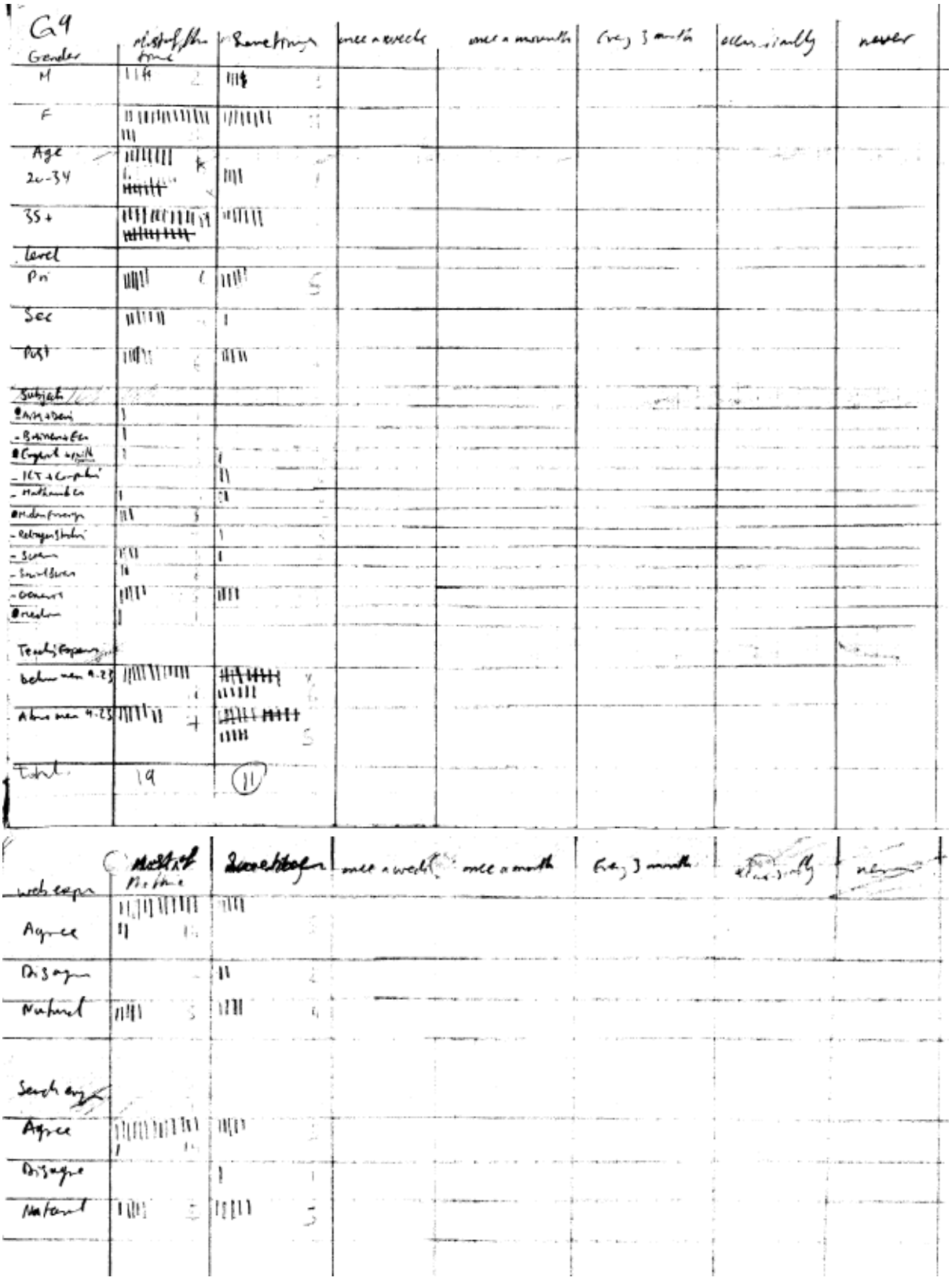


	Google	Google Scholar	Ask Jeeves	Altavista	Yahoo	Aol	MSN	BBC	mamma.com
Gender		(5)	(6)	(3)	(15)	(4)	(2)	(1)	(1)
M	5	0	0	0	2	1	1	1	0
F	24	5	6	3	13	3	2	1	1
Age									
20 - 34	12	2	2	1	6	1	1	-	1
35+	18	3	4	2	9	3	1	1	
Level									
Pri	10	1	2	-	8	2	2	1	-
Sec	8	2	1	1	4	-			
Post	11	2	3	2	3	2			1
Subjects									
- Arts & Humanities	1	1	-	1	1	-			
- Business & Economics	1		-	-					
- English & Literature	2		2	1	1				
- ICT & Computing	2								
- Mathematics	3				1				
- Modern Foreign Languages	3	1	1		1	1			
- Religious Studies	1								
- Sciences	5				4				
- Social Sciences	2	2	2	1					
- Other	8	1	1	-	7	2	2	1	
- Music	1				1				
Teaching experience									
9.23	1	4	3	2	9	1	1	-	1



	Google	Google Sch	Ask Jeeves	Altavista	Yahoo	Aol	MSN	BBC	mamma.com
Title	29	5	6	3	15	4	2	1	1
Use of apparatus - web									
Agree	18	4	5	2	11	4	2		1
Disagree	2				1				
Neutral	9	1	1	1	3	-		1	
Use of apparatus in teaching									
Agree	29	2	4	1	(12)	4	2		1
Disagree	1				1				
Neutral	9	3	2	2	2			1	
Total									




Q9
Gender
M
F
Age
25-34
35+
Level
Pri
Sec
Post
Subject
Total
nice a week
once a month
every 3 months
occasionally
never
Agree
Disagree
Natural

Suggestions

● Problems with the Search tools interface design + Search options

(a) not being able to choose more than one option under each category - i.e. animation,	1 (Teacher)
(b) having many categories/	8 ①
(c) confusion between age & national curriculum	8 ② 2, 14, 10, 6, 11, 7, 5, 19,
(d) for options to be visually displayed to teachers indicating its current status, from default setting i.e. changing background colour, ~~appear~~ ~~wide/Show~~ ~~not expand~~ ~~shrink~~	3 ③ 8, 12, 11
(e) disabling unwanted search options, i.e. audio advanced, + hide/Show - expand & shrink	~~3~~ 5 ④ 14, 11, 9, 23, 25
(f) grouping of search features into separate boxes/spaces	3 10, 11, 9
(g) missing category - exam papers	~~2~~ ~~3~~ ~~2~~ ④ 10, 21, 23, 11 + 19 (2)
(H) not finding resources	1 7
(I) missing category - Lesson plans	1 7
(J) spelling facilities not included	1 13
(K) missing category - applets	1 5
(L) not having worksheets as an extra/plus options.	1 14
(M) Separating business from Economics plus the addition of marketing.	1 14
(O) dividing educational sites into teacher sites + educational sites etc...	14, 10 2 ~~[illegible]~~ ✓

(p) going directly to google		1
(q) layout is unprofessional i.e. Logo, colourses used. layout is plain, bit of text that you have to read	8, 10	2
(r) Scrolling down the page	6	1
(s) revision of file types (meaning), i.e. pdf	10, 12	2
(t) missing subject — psychology	10	1
(u) Language translation facilities	12	1
(v) Short System training		1
(w) Showing popular websites by subject levels was added to 1(c)	14	1
(x) missing item — exam papers, ~~syllabus~~ v year. (Syllabus / curriculum)	19	1
(y) clearer seperation of Result boxes; PoStech v Alternative		1
(z) Search option curriculum, breaking down into Learning objectives. ↑ individual teachers		1
To see top Section of Search options (zz) together with Search results like google rather than having back & forth	23	1
(zzz) to Search ~~for teachers suggested other ways of Search; asking for advice~~ via Key Stage + year than Subject	25	1
(zxz) to have some profile saved at beginning of each year	25	1

Teachers Stating their view about the Adv/benefits of using the Search tool.

(a) The presentation of variety of options derived from both advanced & generic (Standards) options in one single page i.e.	7+1 (Teachers) 1 9 4, 19, 11, 7, 3, 21, 2, 23, 20	(A)
(b) It Saves times	5 6, 18, 3, 16, 22	(B)
(c) Simplicity of the tool	4+1+1 10, 3, 16, 2	(C)
(d) elimination of unwanted commercial + adverts	2	
(e) The first half of the page was generic (Standards) options + the second half was more specific Search features	1	
(f) Subject to training this is easy to understand	2	
(g) Good for generating ideas - but not good for situations where you know what you want exactly.	1 2	
(H) It narrows/the specifies your query	1	
(I) Supportive	1	
(J) user friendliness	1	
(k) worksheet	1	

Information / online resources — Teachers' usages of Search results

(a) will give it as handout	(10) ~~Hard~~ / Teachers (S1)
(b) will copy, paste & then modify	(9) 7+1+1 (S2)
(c) will show on the projector	2
(d) will go to known websites	3
(e) will bookmark in my favourites + read it later	~~6~~ 5 (S3)
(f) will put on the screen/interactive white-board	4 (S9)
(g) Cut & paste it out + print it out	~~1~~ 1+1
(H) read books & go to library before Searching online	1
(I) Save it on USB + read it later	~~2+1~~ 4
(J) will make worksheets	2
(K) will save on hard drive	1
(L) will email the link to Students after teaching/showing it to them in the class.	1+1
(M) will print & read later	4 (S4) 5
(n) will email the link to my self for future refer	—

(p) email it to myself	1
(q) will search via google / government sites / educational sites	1
(r) print it out & include in my lesson plans	1

● Problems with online searching, as described by teachers

(a) resource availability rather than the search engine being good / bad	~~1 5 4~~ 6 (Teachers) (P) 6, 11, 15, 17, 2, 23
(b) being 'free'	1 11
(c) lack of ~~teacher~~ time	4 (SS) 6, 13, 9, 16
(d) school / institutional policy	1
(e) internet connection	1
(f) access to sites (blocked)	1
(h) having to log on	1
I) lack of online resources on difficult subjects / ~~appropriate~~ level	1 down with the above 4(a) ~~7~~ ✓

● Teachers' ~~interest in~~ search engines training

(a) Self taught – trial & error	~~6 +1~~ (T2) 9 14, 8, 10, 11, 7, 5, 23, 25, 20
(b) from previous university qualification	2 18/21
(c) NO – I have no experience	1 16

went home

✓

● ~~Teachers' preferences for learning the Search tools codes~~

(a) No - it's harder	3	Teacher
(b) not all the moment, I have other priorities.	3	
(c) yes	3+1	
(d) yes, maybe	1	

● ~~Teachers' conditions for using the Search tool & recommending to other teachers~~

(a) reliability – consistency in finding relevant & useful resources.	3 ~~2+1+1~~	(Teachers) × 8, 11, 23
b) easy to use	2+~~1~~	
c) Saving + re-accessing selected websites/resources. from with 1 (2x2)	2	3, 16
d) further usage/practice	~~2~~ 7	× 4, 6, 18, 17, 3, 2, 9
e) availability of computer	1	13
f) will use it in conjunction will other Search engines. other ways of the search tool using	1	5
(g) has many subjects/areas & qualification levels	add to 2(a) ↙ 2	
h) very quick / time	~~1+1~~ 2	18, 20
I) Creating user account/profile to Store bookmarked resources.	1	
(J) website where teaching material	1	
~~(K) Structured~~ (K) to Search via specification i.e. AQA as the only website to Search from in Pastels.	1	
(L) to be up-to-date with the changes in Syllabus	1	
(m) to have ~~distribution~~ worksheets for different in the classes.	2	[23, 25]

● Teachers' perception about Search engines + online resources

(a) Lack of stored data	2	(Teacher)
(b) lack of free resources	1	7
(c) advantages of buying online resources in comparison to 'free' resources	1	
(d) School funding – it depends on...	1	7
(e) typing wrong / incorrect metadata		
(f) restricted time	1	

●

(a) Searching professional organisations/ educational websites	✓ 2

● Teachers' suggestions for the type of end-user the Search tool should have/ target

(a) to be used by teachers with little computer and internet experiences	1	5
(b) to be used by students to personalise their online searching (search results)	1	5

only LO ✓

● Teachers' perception — Problems with personalising Search results [redacted]

(a) It reduces the number of Search results I receive	4 (Teacher)
(b) It is time consuming	2

● Teachers' perception — does the Search [redacted]?

(a) No – just some things differently	2
(b) No – It will be faster (new speed)	1
(c) Yes – quicker + easier	3
(d) helps to provide visual resources for students	1
(e) easier, variety of [redacted] (recommended tool)	1

(13) other ~~teachers~~ Suggestions for improving the Search tool

(a) to Search via specifications i.e. AQA as the only website to Search from.

(f) no – could make you more efficient by saving time, new ideas for your teaching — 1

T1(k) → Teacher 5,

T6(b) → Teacher 5, Teacher 3, Teacher 2,

T10(a) → Teacher 5,

T10(b) → Teacher 5,

~~T7(d) → Teacher 9, Teacher 3,~~

T3(h) → Teacher 9,

~~T12(a) → Teacher 9,~~

T4(d) → Teacher 17,

T7(c) → Teacher 3, Teacher 16,

T11(b) → Teacher 19, Teacher 25,

T1(x) → Teacher 19,

T3(p) → Teacher 19.

~~T3(e) → Teacher 19~~

T5(c) → Teacher 16,

T2(f) → Teacher 24, Teacher 21, 9p

T4(e) → Teacher 24,

T4(f) → Teacher 24,

T12(d) → Teacher 24,

~~T1(b) → Teacher 2~~

T2(g) → Teacher 2

T1(22) → Teacher 23

T8(f) → Teacher 23

T12(f) → Teacher 23

T7(m) → Teacher 23, Teacher 25,

T7(n) → Teacher 23

T3(q) → Teacher 25, Teacher 20.

T1(2x2) → Teacher 25

T12(e) → Teacher 25, Teacher 20,

T12(f) → Teacher 25

T1(222) → Teacher 25

T2(j) → teacher 20

T2(k) → teacher 20

T3(r) → teacher 20

T1(2) → teacher 20

T1(L) ⟶ Teacher 14

T1(M) ⟶ Teacher 14

T2(d) ⟶ Teacher 14, Teacher 6,

T1(c) ⟶ Teacher 14, Teacher 10, Teacher 6, ~~Teacher 11, Teacher 18,~~ Teacher 7, Teacher 5, Teacher 19, Teacher 2,

~~T3(a) ⟶ Teacher 14, Teacher 8, Teacher 18,~~

T3(I) ⟶ Teacher 14, Teacher 24, Teacher 25, Teacher 20.

T3(f) ⟶ Teacher 14, Teacher 4, Teacher 6, Teacher 5,

T6(a) ⟶ Teacher 14, Teacher 11, Teacher 20

T12(b) ⟶ Teacher 14

T5(a) ⟶ Teacher 14, Teacher 8, Teacher 10, Teacher 11, Teacher 7, Teacher 5, Teacher 23, Teacher 25, Teacher 20

T1(p) ⟶ Teacher 14

T3(d) ⟶ Teacher 14, Teacher 10, Teacher 7,

T1(e) ⟶ Teacher 14, Teacher 11, Teacher 9, Teacher 23, Teacher 25,

T1(b) ⟶ Teacher 14, Teacher 8, Teacher 4, Teacher 11, Teacher 7, Teacher 13, Teacher 16, Teacher 20,

T1(o) ⟶ Teacher 14, Teacher 10,

T1(w) ⟶ Teacher 14

T11(a) ⟶ Teacher 8, Teacher 10, Teacher 9, Teacher 2,

T1(q) ⟶ Teacher 8, Teacher 10,

T1(d) ⟶ Teacher 8, Teacher 12, Teacher 11,

T3(e) ⟶ Teacher 8, Teacher 12, Teacher 13, Teacher 9, Teacher 19

T7(a) ⟶ Teacher 8, Teacher 11, Teacher 23,

T1(r) ⟶ Teacher 8

T7(b) → Teacher 11, Teacher 22

T8(a) → Teacher 11, Teacher 5,

T5(a) → Teacher 11, Teacher 16,

T3(c) → Teacher 11, Teacher 3,

T8(b) → Teacher 7,

T1(h) → Teacher 7

T1(I) → Teacher 7

T8(c) → Teacher 7

T9(a) → Teacher 7, Teacher 13

T8(d) → Teacher 7

~~T8(a) → Teacher 7~~

T1(J) → Teacher 13

T7(e) → Teacher 13

~~T4(a) → Teacher 13~~

T7(f) → Teacher 5.

T7(d) → Teacher 4, Teacher 6, Teacher 18, Teacher 17, Teacher 3, Teacher 2, Teacher 9, ~~Teacher 3~~

T3(m) → Teacher 6, Teacher 18, Teacher 19, Teacher 16, Teacher 25,

T2(b) → Teacher 6, Teacher 18, Teacher 3, Teacher 16, Teacher 22

T4(a) → Teacher 6, Teacher 11, Teacher 13, Teacher 17, Teacher 2, Teacher 23,

T4(c) → Teacher 6, Teacher 13, Teacher 9, Teacher 16,

~~T12(c) → Teacher 6,~~

T6(d) → Teacher 6

T12(a) → Teacher 18, Teacher 9

T5(b) → Teacher 18, Teacher 21,

T7(h) → Teacher 18, Teacher 20

T1(a) → Teacher 11,

T1(g) → ~~Teacher 11, Teacher 23~~,

T3(a) → Teacher 11, ~~Teacher 7~~, Teacher 7, Teacher 9, Teacher 3, Teacher 16, Teacher 14, Teacher 8, Teacher 18, Teacher 23 Teacher 20

T4(b) → Teacher 11,

T2(c) ⟶ Teacher 10, Teacher 3, Teacher 16, Teacher 2,

T2(e) ⟶ Teacher 10

~~T16(f) ⟶ Teacher 10~~

T1(S) ⟶ Teacher 10, Teacher 12,

T3(J) ⟶ Teacher 10, Teacher 6,

T1(f) ⟶ Teacher 10, Teacher 11, Teacher 9,

T11(t) ⟶ Teacher 10,

T12(c) ⟶ Teacher 10, Teacher 18, Teacher 6

T6(c) ⟶ Teacher 10, Teacher 9, Teacher 17,

T7(g) ⟶ Teacher 10, Teacher 21, Teacher 23, Teacher 11

T1(v) ⟶ Teacher 12,

T2(a) ⟶ Teacher 4, Teacher 18, Teacher 11, Teacher 7, Teacher 3, Teacher 21, Teacher 2, Teacher 23, Teacher 20

T3(b) ⟶ Teacher 4, Teacher 6, Teacher 11, Teacher 7, Teacher 13, Teacher 17, Teacher 2

T3(k) ⟶ Teacher 4

T3(l) ⟶ Teacher 4

Theme 1

Problem with interface design + options

(a) not being able to choose more than one option under each category. i.e. animation

(b) having too many categories / not easy / simple to use.

(c) confusion between age + national curriculum i.e. 11 to 14 – teacher proposed to include qualification too

(d) for options to be visually displayed to teachers indicating its current status, from default setting, i.e. changing background colour.

(e) disabling unwanted search options, i.e. audio advance

(f) ~~into~~ grouping of search features into separate boxes / spaces

(g) missing category – exam papers

(h) not finding relevance

(I) missing category – lesson plans

(J) Spelling facilities not include

~~(K) Confusion with age projected to one subject~~

Theme 2

Adv / benefits of the Search tool:

(a) the presentation of variety of options derived from both advanced + generic, in one single page, i.e. Pdf + PowerPoint

(b) Saves times

(c) Simplicity of the tool

~~(d)~~ cutting down a lot of commercial websites + advertising +/?

(e) first half was generic + second half was more specific.

Theme 3

Method(s) of information being distributed to Students

(P) email it to myself
(M) print + read later
(o) print a page to Student
(a) handout ~~from textbook~~
(b) Copy + paste + modify (personal notes).
(c) projector direct from the website
(d) known websites in favourites
(e) bookmarked it + use read later
(f) ~~Screen~~ put on the screen/instructor while in
(H) read books + go to library + help online search.
(I) Save it on USB + read it later
(J) make worksheets
(k) Save on hard drive

(L) email link to Student

Theme 5

internet/search engine using

(a) ~~no~~ - self taught
(b) previous qualification
(c) NO

Theme 6

Learning online

(a) NO - it's harder.
(b) not at the moment (have other priorities)
(c) Yes.
(d) ~~maybe~~ Yes (maybe)

Theme 4

access restrictions to information + thus using search engine/online searching

(a) resource availability
(b) being 'free'
(c) lack of time (teachers').
(d) institution policy +
(e) internet connection ~~+ access~~
(f) access to sites.

engine

(h) very quick

Theme 7

conditions for using the search tool

(g) how my subject is seen a small branch level.
(a) reliability - consistency in finding relevant + useful resources
(b) easy to use
(c) Saving + re-accessing selected websites/resources.

(f) comparing with

~~Theme 8~~

Problems with online ~~Search~~ engine

wrong online resource

(a) Lack of Stored data — Teacher's perception.
(b) Lack of free resource
(c) advantages of buying online resource
(d) School funding
(e) ~~Lack of Stored data~~ wrong/incorrect metadata

Theme 12

to do your job ~~effectively~~

(a) No — just something effectively
(b) No — faster
(c) Yes — quicker & easier (d) helps to provide visual resource for students

Searching ~~problems~~ q/

(a) Searching professional organisations/educational

Suggestion of uses 10/

(a) to be used by teachers with little Computer & internet experience

(b) to be used by Students to practice Skills

. Problems with ~~Searching~~ Search tool. 11/

(a) reducing the number of Search results.
(b) ~~producing not producing all the results~~
(b) time Consuming.

Appendix VII

Recordings of search sessions (30 video clips)

>>> Please see attach

Appendix VII

Interview transcripts (30 teachers)

>>> Please see attach

Appendix VIII

a. *System specification created for the first search tool (table)*
b. *System translation table created for the first search tool (table)*
c. *Screenshots or interface designed for the first search tool*
d. *User menu designed for the first search tool*
e. *Scenarios put together to introduce the first search tool*
f. *Teacher guide for using the first search tool*
g. *Downloading the first search tool*

>>> Please see attach

Appendix IX

a. *System specification created for the revised search tool (table)*
b. *Teacher guide for using the revised search tool*

>>> Please see attach